HARVARD SCHOOL OF PUBLIC HEALTH

Courses of Instruction

1964–1965

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1964-65

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Section I
Introductory Information

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1965

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1969

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Francis Taylor Pearsons Plimpton, A.B., LL.B., LL.D.
Henry Jacob Friendly, A.B., LL.B., L.H.D., LL.D.
Francis Sargent Cheever, A.B., M.D.
Robert Amory, Jr., A.B., LL.B.

1970

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1964–65

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Assistant to the Dean and Faculty Advisor for Foreign Students: WILLIAM HATHAWAY FORBES, A.B., A.M., DR.PHIL., M.D.

Assistant to the Dean: ROGER BENHAM SPAULDING, A.B.

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Ralph Theodore Esterquest, S.B., S.B. in L.S., A.M.
Office, Building A, Harvard Medical School, 25 Shattuck Street, Boston.

Director, Medical Area Health Service:
Donald Asa Tucker, M.D.
Office, Peter Bent Brigham Hospital, 721 Huntington Avenue, Boston.

The Offices of Administration of the School of Public Health are located at 55 Shattuck Street, Boston.

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* Arranged, with the exception of the Deans, in order of appointment to present rank.

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BERTHA SHAPLEY BURKE, A.M., *Associate Professor of Maternal and Child Nutrition, Emerita.*

HUGO MUENCH, A.B., M.D., DR.P.H., A.M. (hon.), *Professor of Biostatistics, Emeritus.*

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HUGH RODMAN LEAVELL, S.B., M.D., DR.P.H., *Professor of Public Health Practice, Emeritus.*

PROFESSORS *

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JAMES LAVERRE WHITTENBERGER, S.B., M.D., A.M. (hon.), *Physiology (Assistant Dean).*

GORDON MASKEW FAIR, S.B., S.M. (hon.), DR.ING. (hon.), DR. (hon.), SC.D. (hon.), *Sanitary Engineering.*

* For details of title, see listing under the Department.

Fredrick John Stare, s.b., s.m., ph.d., m.d., a.m. (hon.), *Nutrition.*

Thomas Huckle Weller, a.b., s.m., m.d., ll.d., *Tropical Public Health.*

Harold Allen Thomas, Jr., s.b., s.m., s.d., *Sanitary Engineering.*

Dana Lyda Farnsworth, a.b., s.b., m.d., s.d. (hon.), l.h.d., *Henry K. Oliver Professor of Hygiene* and *Director of University Health Services.*

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Geoffrey Edsall, m.d., *Microbiology.*

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Jane Worcester, a.b., dr.p.h., *Biostatistics and Epidemiology.*

Charles Regan Williams, a.b., a.m., ph.d., *Industrial Hygiene.*

Franklin Allen Neva, s.b., m.d., *Tropical Public Health.*

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Clinical Professor

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Robert Pershing Geyer, s.b., s.m., ph.d., *Nutrition.*

Jean Mayer, b.a., b.sc., ph.d., d.sc., *Nutrition.*

Martha Fredericka Trulson, s.b., m.p.h., s.d. in hyg., *Nutrition.*

Benjamin Greeley Ferris, Jr., a.b., m.d., *Physiology.*
Edward Parish Radford, Jr., m.d., *Physiology.*
Albert Damon, a.b., ph.d., m.d., *Epidemiology.*
Samuel Dennis Bell, Jr., a.b., m.d., m.p.h., *Microbiology.*
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Eli Chernin, s.b., a.m., s.d., *Tropical Public Health.*
Charlotte Catherine Campbell, s.b., *Microbiology and Tropical Public Health.*
Melvin William First, s.b., s.m., s.d., *Industrial Hygiene.*
Herbert Leonard Ley, Jr., m.d., m.p.h., *Epidemiology and Microbiology.*
Mary Ochsenhirt Amdur, s.b., ph.d., *Physiology.*
Leon Sternfeld, s.b., m.d., ph.d., m.p.h., *Maternal and Child Health.*
Marjorie Anne Christina Young, s.b., ed.m., m.p.h., dr.p.h., *Public Health Practice.*
Thomas Feger Pugh, m.d., m.p.h., *Epidemiology.*

Associate Clinical Professor

George Franklin Wilkins, a.b., m.d., *Industrial Hygiene.*

Lecturers

William Hathaway Forbes, a.b., a.m., dr.phil., m.d., *Physiology.*
William Leslie Claff, a.b., m.b.a., *Public Health Practice.*
Robert Alvan MacCready, s.b., m.d., *Microbiology.*
Samuel Goodman McClellan, a.b., m.d., m.p.h., *Epidemiology.*

Assistant Professors

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Stanley Norton Gershoff, a.b., s.m., ph.d., *Nutrition.*
Oscar William Portman, s.b., m.d., *Nutrition.*
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Nedd Robert Frank, a.b., m.d., *Physiology.*

Thomas Eliot Frothingham, m.d., *Tropical Public Health.*
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Jacob Shapiro, s.b., s.m., ph.d., *Industrial Hygiene.*
William Alfred Burgess, s.b. in mech.eng., s.m., *Industrial Hygiene.*
Isabelle Valadian, m.d., m.p.h., *Maternal and Child Health.*
John Benjamin Wyon, b.a., m.b.,b.ch., m.p.h., *Demography and Human Ecology.*
Lenin Allen Baler, a.b., a.m., ph.d., s.m. in hyg., s.d. in hyg., *Public Health Practice and Biostatistics.*
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Edward Harlen Michelson, s.b., s.m., ph.d., *Tropical Public Health.*
Roger Loyd Nichols, a.b., m.d., *Microbiology.* (Absent 1964–65)
Steve Chia-tung Pan, b.sc., m.d., m.p.h., *Tropical Public Health.*
Roy Penchansky, s.b., m.i.l.r., d.b.a., *Public Health Practice.*
Norman Allan Scotch, a.b., a.m., ph.d., s.m. in hyg., *Public Health Practice.*
Ascher Jasha Segall, m.d., m.p.h., dr.p.h., *Epidemiology.*
David MacAlpine Heer, a.b., a.m., ph.d., *Biostatistics, Demography and Human Ecology.*
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Stephen J. Plank, ph.b., a.b., m.d., m.p.h. dr.p.h., *Demography and Human Ecology.*
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Associates

Margaret Elizabeth Drolette, a.b., m.p.h., *Biostatistics.*
Roland Chesley Moore, a.b., a.m., ph.d., *Physiology.*
Marvin Nelson Glasser, b.b.a., m.p.h., s.d. in hyg., *Biostatistics and Epidemiology.*
Robert Burnett McGandy, a.b., m.d., m.p.h., *Nutrition.*
Andrew Spielman, s.b., s.d., *Tropical Public Health.*
Howard Webster Stoudt, Jr., a.b., a.m., ph.d., s.m. in hyg., *Physiology.*

Members of the Faculty

Ralph Theodore Esterquest, s.b., s.b. in l.s., a.m., *Librarian, Schools of Medicine, Dental Medicine and Public Health.*

Donald Asa Tucker, m.d., *Director, Medical Area Health Service.*

Margaret Guss Barnaby, a.b., *Administrative Assistant to the Dean* (Honorary member).

Roger Benham Spaulding, a.b., *Assistant to the Dean.*

The names of the members of the teaching and research staff are listed in their respective departments under Content of the Courses, pages 37–86.

INTRODUCTION

The Harvard School of Public Health is one of the six privately endowed institutions in the United States which are primarily devoted to graduate education in public health. The School operates as an independent unit of Harvard University in close association with the Faculty of Arts and Sciences; the Graduate Schools of Education, Public Administration and Business Administration; the Medical School; the School of Dental Medicine; and the various Harvard hospitals. This introduction indicates in a general way the opportunities the School affords those students who are seeking a career in one or more of the three principal areas of public health activities: teaching, research, and administration.

Public health evolved from the early combination of medical science and engineering for the control of environmental hazards. Public health has grown to embrace various facets of the biological, physical and social sciences as the community aspects of health problems have become more complex. In its plans for the future, the Harvard School of Public Health is principally concerned with two general kinds of problems. In the first category are the problems which have emerged as certain areas of the world have become highly urbanized and technologically advanced. Foremost among these problems are mental illness, cancer and the degenerative diseases, accidents, and the hazards of ionizing radiations. Discovery of causes and factors which modify the course of illness and injury is necessary for the development of prevention and control. Research is also needed to achieve effective administrative technics for the provision of optimum health services for entire communities.

The other general category of problems in public health derives from the fact that more than half of the people in the world reside in areas seriously afflicted by malnutrition and communicable diseases. The programs which have been successful in the technologically advanced countries often cannot be used because of basic differences in culture, geography or economic factors.

In its approach to these problems the Harvard School of Public Health has as its objective the advancement of public health, both

nationally and internationally. The School seeks to accomplish its objective through its activities in education and by its search for knowledge. The Faculty is equally committed to basic research in new fields and to the development of effective methods for the application of knowledge by communities or nations. The Faculty of the School and its alumni have the opportunity to play a role of major importance in the decades ahead as the profession of public health deals with the health problems of our rapidly changing societies.

The primary intent of the curriculum in the Harvard School of Public Health is to attract individuals who have the potentiality for original contributions to public health. In the selection of applicants preference will be given by the Admissions Committee to students who are capable of undertaking a course of study leading to a doctoral degree in one of the departments or disciplines of the School.

FACILITIES

Most departments of the School of Public Health are housed in four buildings: the Rotch Building at 55 Shattuck Street, the Huntington Building at 1 Shattuck Street, and two research buildings at 665 Huntington Avenue, Boston 02115. The administrative offices are in the Rotch Building. The School's buildings are adjacent to the Harvard Medical and Dental Schools, the Children's Medical Center, the Peter Bent Brigham Hospital, and the Boston Lying-In Hospital.

The facilities of the hospitals and the adjacent institutions are available to qualified students of this School, and are used in connection with the teaching of various subjects. In addition, students enrolled at the School may take courses in other departments of Harvard University, such as in the social sciences, public administration, and medical sciences. Certain graduate courses at the Massachusetts Institute of Technology are also open to students of this School.

The Department of Sanitary Engineering of the School is also part of the Division of Engineering and Applied Physics of the Harvard Graduate School of Arts and Sciences. The basic course in Water and Food Sanitation for students of the School of Public

Health is taught here, but properly qualified students may also register for courses in Sanitary Engineering given in Cambridge.

The School maintains a close association with a wide variety of health, medical care, and welfare organizations in Massachusetts and elsewhere. These include health departments, hospital and other medical facilities, private health and welfare agencies, and community planning groups. These organizations provide opportunities for observation and special studies, and members of their staffs are available to assist in the School's educational program. Administrative methods at local levels may be studied at first hand in some of these agencies in the Greater Boston Area.

The Institute of Laboratories of the Massachusetts Department of Public Health is engaged in a program of general interest, attracting visitors and students from various parts of the United States and from foreign countries. It not only performs a wide variety of standard bacteriological, immunological and chemical procedures, but is actively engaged in several research programs. Its Superintendent is a member of the School's Faculty. This close contact with one of the country's outstanding laboratories provides unsurpassed opportunities for qualified students who wish to obtain intensive experience in many types of laboratory methods of particular pertinence to public health.

The clinical and laboratory facilities of the Lemuel Shattuck Hospital are available to students of the School. This hospital was built by the Department of Public Health of the Commonwealth of Massachusetts for the treatment and rehabilitation of patients with chronic diseases. Since the average duration of hospitalization is usually longer than that in general hospitals, an opportunity is afforded to study chronic disease problems not encountered in general hospitals. The training program, consultant rounds and professional staff appointments are under the aegis of the Deans of Boston University, Harvard and Tufts University Medical Schools, as well as the Harvard School of Public Health. Research laboratories at the Shattuck Hospital are engaged in studies of arthritis, hematology, pulmonary function, radioisotopes, cancer therapy and chronic renal and hepatic diseases.

Libraries

The joint Library of the School of Public Health and the Harvard Medical School is on the second floor of the Administration Building of the Medical School. It is open from 9 a.m. until 11:30 p.m. on week days, from 9 a.m. until 5 p.m. on Saturdays, and from 2 p.m. until 6 p.m. on Sundays. There are at present 300,000 catalogued volumes and pamphlets, and 2,100 periodicals are received currently.

Students also have the privilege of using the College Library in Cambridge, as well as the various departmental libraries belonging to the University, in all of which there are more than 4,000,000 volumes and pamphlets.

The Boston Medical Library, No. 8 The Fenway, contains about 225,000 bound volumes and 160,000 pamphlets, and receives 1,800 current periodicals. This valuable library is open on week days from 9 a.m. to 5 p.m., Saturdays 9 a.m. to 1 p.m., and on Mondays and Thursdays until 9 p.m., Oct. 1 through May 31.

Students of the School also have access to the Boston Public Library.

In the spring of 1965 the joint Library and the Boston Medical Library will merge their collections and services in the new Francis A. Countway Library of Medicine, now under construction next to the No. 1 Shattuck Street building of the School of Public Health.

EXTRACURRICULAR EVENTS

A significant part of the opportunity for the exchange of knowledge in the health fields is the extracurricular activity which takes place under student or faculty sponsorship. Throughout the year there are informal interchanges of ideas among members of the student body and their families, particularly in the social and recreational areas of the Henry Lee Shattuck International House. In addition there are discussions on topics of international interest including presentations by students on the culture, geography, and social structure of their home countries. The Henry Lee Shattuck International House has equipment for showing films and colored slides which facilitates the scheduling of such occasions.

Section II

Admission Requirements
Courses of Study and Degrees

ADMISSION REQUIREMENTS

Application for Admission

Applicants for admission to the School must submit the following material for consideration by the Committee on Admissions and Degrees: (1) completed application form; (2) transcripts of academic record at college, graduate school and/or professional school; (3) names of at least three people, well acquainted with the applicant's previous work, from whom the School may request letters of reference.

Applicants from countries in which the language of instruction is not English must satisfy the Committee on Admissions and Degrees as to their ability to speak, read, write and understand the English language competently. In order to profit from a program of graduate study, the applicant must have sufficient knowledge of English to enable him to understand lectures in English, to participate in seminar discussions and to write examinations. In the absence of sufficient evidence from the sponsoring agency and other sources, the School may request that the applicant take and pass satisfactorily the University of Michigan English Language Test. If, upon arrival at the School, a student's command of English is found to be inadequate, he may be required to take further instruction in English.

In addition to fulfilling the specific requirements for admission to the several degree programs, applicants must satisfy the Committee as to their scholastic ability and potentiality for profitable study at a graduate level. In all instances, the final judgment as to the admissibility of an applicant rests with the Committee on Admissions and Degrees.

Preference will be given to applicants under 40 years of age; applicants over 45 years of age may be considered for admission only under exceptional circumstances.

The School is unable to accept all who apply and are eligible for admission. Therefore, persons who wish to be considered for ad-

mission to the 1965–66 Class are urged to submit their applications by April 1, 1965. However, applications which are completed *by July 31, 1965*, will be considered, subject to availability of space.

Admission of a candidate for one academic year does not automatically admit him in a subsequent year; re-application must be considered on the candidate's own merits in the light of the particular circumstances which govern the decisions of the Committee on Admissions and Degrees.

All inquiries and communications regarding admission should be addressed to The Registrar, Harvard School of Public Health, 55 Shattuck Street, Boston, Massachusetts, 02115.

Living Expenses

Experience has shown that it is difficult for a student to get the most out of his year at the School if he has to be unduly concerned about funds to meet his expenses. Living costs in the Boston area are usually found to be higher than in most areas from which students come. Therefore, the School has adopted the policy stated below in regard to applicants for admission from outside the United States.

An applicant whose financial support is not guaranteed by an official U. S. agency or foundation must submit evidence satisfactory to the School that he will have sufficient funds available in U. S. currency to enable him to pay his expenses during the academic year. The minimum amount needed by a single person, in addition to travel, is $3,800, to cover the cost of tuition ($1,520) and living expenses of at least $250 a month for nine months. If an applicant plans to bring his family, he must have at least $900 more for his wife and $450 for each dependent child, in addition to travel expense. Certification of adequate financial resources must be received by the School before the immigration form needed to obtain a visa to enter the U.S. can be issued to the student.

COURSES OF STUDY AND DEGREES

Master of Public Health Degree

Requirements for Admission

1. Applicants may be considered for admission as candidates for the Master of Public Health degree if they are graduates of approved schools of medicine or if they have similarly thorough preparation in the biological sciences.

2. Persons with these qualifications must satisfy the Committee on Admissions and Degrees as to their scholastic abilities and potentiality for profitable study at a graduate level. In arriving at its decision, the Committee will give consideration to practical experience when relevant.

Requirements for the Degree

1. One academic year must be spent in residence at the University. The student must complete successfully the required and elective courses to a minimum total of 40 credit units. The basic curriculum for the Master of Public Health degree includes courses in ten areas. All candidates for the degree are required to take the following four courses, unless they can demonstrate equivalent preparation:

Course	*Credit units*
Biostatistics 1a,b	3.5
Epidemiology 1a,b	2.5
Public Health Practice 1a,b	3
Environmental Health 1d	2.5

2. In addition they must elect a minimum of 12.5 credit units in the remaining six courses of the basic curriculum, as follows:

Ecology and Epidemiology of Infectious Diseases	*Credit units*
(Microbiology and Tropical Public Health 1a,b,c)	6
Epidemiology of Non-Infectious Disease (Epidemiology 2c,d)	3
Man's Responses to the Physical Environment (Environmental Health 1b)	2.5

The Human Community (Interdepartmental Course 1a)	2.5
Principles of Maternal and Child Health (Maternal and Child Health 1c)	2
Public Health Nutrition (Nutrition 1a,b)	2.5

3. The remainder of the time will be devoted to departmental or divisional courses, seminars and tutorial work. These courses are described on pages 37–86. Courses offered by other Faculties of the University are also available.

4. No formal classes are scheduled during the one-week period from February 1 to February 6, 1965. This time is to be used for supervised special studies or field observations. All candidates for the Master of Public Health degree are required to register for work during this week, under Course 17e (Tutorial) or Course 30e (Field Study). See listings under the Departments for opportunities available. One unit of credit will be given for satisfactory completion of the week's assignment.

Master of Science in Hygiene Degree
(With Designation of a Field of Concentration)

This degree is granted on fulfillment of a program of advanced work in one of the basic disciplines of public health. The courses taken must form an integrated plan of study in one branch of knowledge and allied subjects.

Requirements for Admission

Applicants may be considered for admission as candidates for the Master of Science in Hygiene degree, on the basis of a one-year or a two-year program, if they meet the requirements in one of the categories listed below. They must also satisfy the Committee on Admissions and Degrees and the department within which they choose to specialize as to their potentiality for successful study at a graduate level within the School.

A. One-year Program

1. Applicants who are graduates of approved schools of medicine

or who have similarly thorough preparation in the biological sciences.

2. Applicants who have a doctoral degree from an approved school in a discipline related to public health.

3. Applicants in public health specialties (social workers, nurses, health educators, nutritionists) who have obtained a master's degree with honor grades in their special fields and have had at least two years' acceptable experience in a public health activity.

4. Applicants in industrial hygiene or public health engineering who have a bachelor's degree with honor grades in physics, chemistry and engineering and who have a master's degree or equivalent graduate work with honor grades.

B. **Two-year Program**

1. Applicants with a bachelor's degree obtained with honors in the natural sciences who wish to specialize in one of the laboratory sciences or statistics.

2. Applicants with a bachelor's degree obtained with honors and with an adequate background in the natural sciences who wish to specialize in health education.

Under certain circumstances, a year of graduate work in another institution may be accepted as the first year of this program.

Requirements for the Degree

1. The student must spend a minimum of one year in residence at the University and must complete successfully a program of at least 40 credit units. Candidates in the two-year program must obtain at least 80 credit units.

2. All candidates for the degree are required to take Biostatistics and Epidemiology (Interdepartmental Course 2a,b,c,d) or, depending on their backgrounds, Biostatistics 1a,b and Epidemiology 1a,b, unless they can demonstrate equivalent preparation. The remainder of the program will be devoted to courses which may be prescribed by the department of concentration and to elective courses in the primary and related fields of interest. These courses are described on pages 37–86. Courses offered by other Faculties of the University are also available.

3. No formal classes are scheduled during the one-week period from February 1 to February 6, 1965. This time is to be used for supervised special studies or field observations. All candidates for the Master of Science in Hygiene degree are required to register for work during this week, under Course 17e (Tutorial) or Course 30e (Field Study). See listings under the Departments for opportunities available. One unit of credit will be given for satisfactory completion of the week's assignment.

Master of Industrial Health

A program of courses leading to a Master of Industrial Health degree was established in 1949, in recognition of the need for post-graduate training in the public health disciplines which are relevant to the development of health and medical programs in industry.

Requirements for Admission

Candidates for this degree must be graduates of an acceptable school of medicine and must also satisfy the Committee on Admissions and Degrees as to their scholastic abilities and potentiality for profitable study at a graduate level. Students from the United States must have completed an internship of at least twelve months in a hospital approved by the American Medical Association.

Requirements for the Degree

1. One academic year must be spent in residence at the University.

2. The student must complete successfully the required and elective courses to a minimum total of 40 credit units. All candidates for the degree are expected to take the following courses unless they can demonstrate equivalent preparation:

Course	*Credit units*
Biostatistics 1a,b	3.5
Epidemiology 1a,b	2.5
Environmental Health 1d	2.5
Environmental Health 2a,b (Radiological Hygiene)	4
Environmental Health 7d (Occupational Medicine)	2

Industrial Hygiene 1c,d (Basic Problems in Occupational Health and Industrial Environments)	7
Industrial Hygiene 2a,b (Industrial Air Analysis)	4
Total	25.5

In addition, the student may select from the general curriculum courses of interest to him, or do special work subject to approval of the Heads of the Departments of Industrial Hygiene or Physiology.

3. No formal classes are scheduled during the one-week period from February 1 to February 6, 1965. This time is to be used for supervised special studies or field observations. All candidates for the Master of Industrial Health degree are required to register for work during this week, under Course 17e (Tutorial) or Course 30e (Field Study). See listings under the Departments for opportunities available. One unit of credit will be given for satisfactory completion of the week's assignment.

Doctor of Public Health

For the degree of Doctor of Public Health the student must complete an approved program of independent and original investigation in a special field and must present the results of this research in an acceptable thesis.

Requirements for Admission

1. An applicant for admission to candidacy for this degree must be either (a) a graduate of an approved school of medicine, dental medicine or veterinary medicine, or (b) the holder of another doctoral degree in one of the basic sciences related to public health. In exceptional cases, an individual lacking a previous doctoral degree may be admitted if he has displayed outstanding ability in previous academic work and in practical public health experience.

2. The applicant must hold the degree of Master of Public Health or its equivalent from a recognized institution and must have dem-

onstrated potential ability to undertake original investigation in a special field.

3. Admission to doctoral candidacy is considered provisional until the candidate has passed the oral qualifying examination.

Doctor of Science in Hygiene
(With Designation of a Field of Concentration)

This degree is granted on successful completion of a program of independent and original research in one of the basic disciplines of public health, and the presentation of this research in an acceptable thesis.

Requirements for Admission

Candidates for the degree of Doctor of Science in Hygiene must hold the degree of Master of Science in Hygiene or its equivalent and must indicate ability to undertake original investigation in a special field.

Admission to doctoral candidacy is considered provisional until the candidate has passed the oral qualifying examination.

Requirements for Doctoral Degrees

1. Residence

The student is required to complete a minimum of one academic year in residence. However, the required work and preparation of an acceptable thesis normally requires two full years and frequently longer.

2. Doctoral Program Advisor

After the student enrolls in the School as a provisional doctoral candidate, a Doctoral Program Advisor is appointed by the Department of concentration. This Advisor will keep the student informed of all procedures and requirements for the degree, will advise him about proper courses to be taken, will decide, together with the De-

partment, when the student is prepared to take the qualifying examination, and will supervise the thesis work.

3. **Foreign Language Requirement**

The candidate must possess a reading knowledge of two languages, other than English, which will enable him to make use of the foreign literature pertinent to his professional interests, including his thesis subject. One of the languages must be French, German or Russian; the second may be another of these three languages or an additional one selected with the consent of the Department of concentration and the Committee on Admissions and Degrees. For a foreign student one of the languages may be his native tongue, subject to the approval of the Committee on Admissions and Degrees. One language examination must be passed before the candidate is permitted to take the qualifying examination. The second language examination must be passed before the appointment of the Readers of the Thesis. The candidate is urged to satisfy the language requirements as early as possible.

4. **Qualifying Examination**

When the Advisor and the Department judge that the candidate is prepared, an oral qualifying examination is conducted by Special Examiners, who examine in depth in the area of the candidate's general academic knowledge, his major interest, and related fields. This examination should be taken within six months, but no later than one year, after admission as a provisional doctoral candidate.

5. **Evaluation of Candidate's Progress**

After the candidate has passed the qualifying examination, two Faculty members are appointed to aid the Advisor in the periodic evaluation of the student's progress.

6. **Deadline Dates for Thesis**

After the Advisor and Department deem the thesis completed, it shall be typed in final form. Three unbound copies must be deposited in the Dean's Office *before January first*, for degrees to be awarded

at midyear, and *before April fifteenth* for degrees to be awarded in June. The thesis must be accompanied by 100 copies of a summary not exceeding 1200 words in length, which shall indicate clearly the purpose, methods, and results of the investigation.

7. Acceptance of the Thesis and Final Examination

When the thesis is submitted, three Readers will be appointed to determine if it is acceptable. If it is approved, a final examination will be given at which the student will defend his thesis before members of the Faculty, including the Readers. Ordinarily, the thesis must be approved within five years of the date of the qualifying examination.

A detailed statement of procedures and requirements for the doctoral program and for the preparation of the thesis may be obtained from the Registrar after the student has been admitted to provisional candidacy for the degree.

Special Students

Subject to availability of space, the School may accept a few students, on a full-time or a part-time basis, who are not degree candidates, but who are interested in taking one or more courses in a special field. Procedures and requirements for the admission of such students are the same as for degree candidates. Special students who later wish to be admitted to degree candidacy will be considered on the same basis as other applicants for admission. Admission as a special student carries with it no commitment to accept the applicant as a degree candidate.

Degrees in Engineering

Graduates of engineering colleges or scientific schools of recognized standing who are interested in the environmental engineering aspects of public health may be admitted to the Division of Engineering and Applied Physics of the Graduate School of Arts and Sciences as candidates for the degree of Master of Science, Master

of Arts, Master of Engineering or Doctor of Philosophy. They may elect appropriate courses in the School of Public Health as a part of the program for these degrees.

For further information write to the Committee on Admissions, Graduate School of Arts and Sciences, Holyoke Center, 75 Mt. Auburn Street, Cambridge, Massachusetts, 02138.

Grading System

The grading system in effect at the School of Public Health is as follows: A and B are honor grades; C is acceptable; D is acceptable but of inferior quality; F is failing. Grade averages are computed on the basis of numerical equivalents, and according to the number of credit units in each course: A–1, B–2, C–3, D–5, F–8. The minimum level of performance acceptable for a Master of Public Health degree is C–(3.5) average. The minimum level of performance acceptable for a Master of Industrial Health or Master of Science in Hygiene is C (3.0) average. All graded courses are included in the average. The minimum level of performance acceptable for admission to doctoral degree candidacy is 2.5, based on at least one term's work.

A student cannot qualify for a degree if he fails one or more required courses. However, if he fails only one required course, he may request a re-examination in that course. Re-examination will be given subject to approval of the instructor in the course and of the Committee on Admissions and Degrees, and will normally be given only after a period of additional study or course work, within a period of eight weeks following the initial failure.

A grade recorded as "Incomplete" will be changed to "F" if the course requirements are not satisfactorily fulfilled by the end of the next period or before the end of the academic year, whichever comes first.

Section III
Content of Courses

CONTENT OF COURSES

INTERDEPARTMENTAL COURSES

Interdepartmental Course 1a. The Human Community

Lectures and seminars. *Mondays and Fridays, 8:30–10:30, Wednesdays, 8:30–9:30, first period.* Dr. Reed, Dr. Levine and associates.

Credit 2.5 units.

One of the six semi-elective courses from which Master of Public Health candidates are required to elect a minimum of 12.5 credit units.

Comprehension of health problems and implementation of health programs depend upon understanding the forms and forces active in community life. This course of instruction deals with demography, social and cultural characteristics of human populations, the organization and behavior of human communities, and their relationship to the environment. The objective of the course is to provide a knowledge of, and a set of concepts dealing with, human populations, interpersonal relationships, cultural values, and social organization, in preparation for the study of public health.

Interdepartmental Course 2a,b,c,d. Biostatistics and Epidemiology

Lectures, discussions and laboratory. *Tuesdays, 10:30–12:30, Saturdays, 9:30–11:30 in all four periods; Thursdays, 11:30–12:30, first period; Thursdays, 10:30–11:30, second, third and fourth periods.* Dr. Worcester, Dr. Bell and Dr. Hutchison.

Credit 7 units.

Required of Master of Science in Hygiene candidates (except those eligible to take Biostatistics 1a,b and Epidemiology 1a,b).

Epidemiology and biostatistics are two disciplines essential to the investigations of problems of health and disease at a community level. This course is an attempt to provide integrated teaching in these two subjects to a small group of students without medical background. Biostatistics, demography and epidemiology will be presented. There will be sessions devoted to the medical and biological sciences (e.g. immunology and genetics). A small number of diseases will be covered in detail to show the methods by which our present level of knowledge has been reached and to illustrate the principles of epidemiology. There will be laboratory exercises and demonstrations. Classic, as well as current, literature in epidemiology will be assigned.

Interdepartmental Course 3b. History and Philosophy of Public Health

Seminars. *Wednesdays, 3:30–5:30, second period.* Dr. Mayer and Visiting Lecturers.

Credit 1 unit.

The course has two major purposes: to help the student of Public Health gain a picture of the development of his profession, and to use selected historical situations to illustrate how scientific knowledge has interacted in the past with political structure, economic status and cultural attitudes in the determination of the health goals of various societies and the execution of programs. In this light, the development of the science and practice of medicine, sanitary engineering and demography in Ancient Egypt, Greece and Alexandria, Rome, the Arab and European Middle Ages and the Renaissance will be broadly sketched. The birth of the concept of a National Health Policy will be traced to the Ages of Mercantilism and Enlightenment. The Sanitary Movement and its relation to the Industrial Revolution will be examined with particular reference to Britain, France and the United States. Finally, an attempt will be made to evaluate the extent to which the lessons of history can be used in the formulation of health policies by emerging nations.

Interdepartmental Course 4c,d. Research Methods in Community Health

Lectures and discussions. *Tuesdays and Thursdays, 8:30–10:30, third and fourth periods.* Dr. Reed, Dr. Levine and associates.

Credit 4 units.

This elective course, offered by members of the Biostatistics and Public Health Practice Departments, is intended primarily for doctoral candidates and other advanced students who require specialized preparation to conduct or administer scientific research on social and community aspects of health, health behavior and health organization. The merits of alternative research designs will be covered by means of lectures, discussions of current research projects, and presentations of students' own research plans. Instruction will cover a range of methods and techniques including survey methods, case and longitudinal studies, as well as relevant statistical techniques, methods of constructing and administering interviews, and other methods of data collection and analysis. Admission is limited and requires the consent of the instructors.

Interdepartmental Course 42a,b,c,d. Seminar on Teaching of Preventive Medicine and Public Health

Seminars. Time to be arranged in all four periods. Dr. Segall and Dr. Ley.

Credit 3 units.

The seminars are designed for students who are preparing for careers as teachers of preventive medicine and public health. Components of the preventive medicine curriculum are considered with respect to course organization and instruction. Current aspects of educational theory relevant to the

teaching of medical students are discussed by visiting specialists. Opportunity for field observation of teaching within selected departments of preventive medicine is provided.

DIVISION OF ENVIRONMENTAL HEALTH SCIENCES AND ENGINEERING

James L. Whittenberger, s.b., m.d., a.m. (hon.), *Head of the Division*

The Division includes the Departments of Industrial Hygiene, Physiology and Sanitary Engineering. The names and titles of the Faculty and Staff members of the Division, and the courses available, are listed in the respective departments.

Divisional Courses

Environmental Health 1b. Man's Responses to the Physical Environment

Lectures, demonstrations and field trips. *Mondays and Fridays, 8:30–10:30, Wednesdays and Saturdays, 8:30–9:30, second period.* Dr. Ferris and associates.

Credit 2.5 units.

One of the six semi-elective courses from which Master of Public Health candidates are required to elect a minimum of 12.5 credit units.

Physiologic responses evoked by the physical and chemical attributes of man's environment will be described and the limits of such responses emphasized. Methods for assessing and controlling environmental stresses will be presented. Topics covered will include: temperature, humidity, barometric pressure, ionizing radiation, air pollution, toxicology, illumination, and noise.

This course is intended for Master of Public Health candidates who are not specializing in Industrial Hygiene or Occupational Medicine. It is also open to other students who have had Physiology 1a,b or its equivalent and who have had chemistry and physics at a college level.

Environmental Health 1d. Principles of Water and Food Sanitation

Lectures and demonstrations. *Tuesdays and Thursdays, 10:30–12:30, Saturdays, 9:30–11:30, fourth period.* Professor Fair, Professor Thomas and Associate Professor Stumm. The hour from 11:30–12:30 on Thursdays is a discussion period. It is optional and carries no credit.

Credit 2.5 units.

Required of Master of Public Health and Master of Industrial Health candidates. Candidates for the degree of Master of Science in Hygiene may also elect this course.

This course emphasizes some of the broad engineering principles useful in

the control of man's environment. These principles are presented in a manner appropriate to students who have no engineering background. Technics of control are discussed, but are presented as illustrations of principle, not as rule-of-thumb procedures that the student is expected to learn by rote. One or two field visits are made to show the application of principles in practice.

The objective of the course is not the conversion of the student into an engineer, ready to design water works, or develop milk-pasteurizing plants, but rather to prepare him to advise, to cooperate with, and to understand the people who are to do the job. It also acquaints him with the nature and extent of the sanitary problem, with what can be and has been accomplished by water and food sanitation, and with what may be expected to be done in the future.

The topics considered include: water supply and purification; the sanitation of swimming pools and bathing beaches; sewerage and sewage treatment; refuse and nightsoil collection and disposal; and food, milk and shellfish sanitation.

Environmental Health 2a,b. Radiological Hygiene

Lectures, laboratories and field trips. *Wednesdays, 3:30–4:30, Fridays, 1:30–5:30, first and second periods.* Dr. YODER and Staff of the Division.

Credit 4 units.

This course will present the essentials of atomic and radiation physics as an introduction to the evaluation of health hazards from ionizing radiation. Students with adequate background in physics and mathematics may be excused from the lecture portion of the course. Credit for the laboratory alone is 1.5 units.

Environmental Health 2c,d. Problems in Radiation Dosimetry

Lectures. Two hours a week, time to be arranged, third and fourth periods.
Laboratory. *Mondays, 1:30–4:30, third and fourth periods.* Dr. SHAPIRO.

Credit 3 units.

Experimental and theoretical methods of evaluating radiation fields and determining radiation dose rates. Special dosimetry problems for study in the laboratory are selected from the fields of health physics, nuclear engineering and nuclear medicine.

Environmental Health 3a,b and 3c,d. Occupational Medical Clinics

Clinics, Peter Bent Brigham Hospital, *Saturdays, 9:30–11:30, first and second periods.* Dr. MILLER.

Clinics, Lemuel Shattuck Hospital, two hours a week, time to be arranged, third and fourth periods. Dr. TYLER.

Credit 1 unit for each clinic series.

Occupational Medical Clinics at teaching hospitals will be offered in all four periods. The clinics at the Peter Bent Brigham Hospital and the Lemuel Shattuck Hospital will emphasize the effect that non-occupational disease may have on the working capacity of the individual.

The clinics are limited to physicians and will not be offered if less than four enroll.

Environmental Health 4c,d. Occupational Medical Clinics

Clinics, Massachusetts General Hospital, *Fridays, 1:30–3:30, third and fourth periods.* Instructor to be announced.

Credit 1 unit.

These clinics are concerned with diseases due to occupation, such as silicosis, beryllium intoxication, coal miner's pneumoconiosis, lead poisoning, etc.

The clinics are limited to physicians and will not be offered if less than four enroll.

Environmental Health 5a,b,c,d. Aviation Health and Safety

Seminars. *Wednesdays, 1:30–3:30, first and second periods; Wednesdays, 10:30–12:30, third and fourth periods.* Dr. McFarland.

Credit 1 unit each period.

The purpose of these seminars is to integrate the work in the basic courses of public health and preventive medicine with the specialized problems of aviation health and safety. Lectures and discussions are arranged throughout the year, led by the students, the instructor, and various biological and medical specialists in the University. Visiting lecturers from other universities and research centers also participate in the seminar.

Admission is by permission of the instructor.

Environmental Health 6c,6d. Human Factors in Occupational Performance and Safety

Lectures and demonstrations. *Tuesdays and Thursdays, 11:30–12:30, third period; Fridays, 8:30–10:30, fourth period.* Dr. McFarland.

Credit 1 unit in each period.

In the third period, the lectures and discussions emphasize the application of experimental psychology, anthropology, and biotechnology to the problems of occupational performance and adjustment. Consideration is given to the matching of psychological and physical abilities to job requirements. Emphasis is placed on the importance of designing equipment and work practices in terms of human capabilities and limitations, including those related to fatigue, aging, and environmental stress. In the fourth period the lectures and seminars explore interdisciplinary methods in the analysis and

prevention of accidents and injuries. While the major emphasis is on occupational safety, the prevention of other types of accidents is also included.

With permission of the instructor, either period may be taken separately.

Environmental Health 7d. Occupational Medicine

Lectures. Two hours twice each week, time to be arranged, fourth period. Dr. Ferris and Dr. Wilkins.

Credit 2 units.

The topics in this course will include the administration and organization of occupational medical departments, physical examinations, rehabilitation, counselling, and medico-legal problems. Guest lecturers will present problems associated with specific industries. The course will not be offered if less than four enroll.

Environmental Health 8c,d. Community Air Pollution

Lectures, demonstrations and seminars. Two hours a week, time to be arranged, third and fourth periods. Dr. First and Staff of the Division.

Credit 2 units.

An advanced lecture and seminar course for students in industrial hygiene, sanitary engineering and environmental physiology. It will cover micrometeorology and its relation to air pollution site surveys, community air pollution control and appraisal, and solid waste disposal by incineration.

Environmental Health 30e. Field Work

Credit 1 unit.

A week of supervised field observation will be offered from February 1 to February 6, 1965. Students may choose appropriate visits to medical or industrial hygiene departments of industries, airports, and other agencies which have operations or research in the field of environmental health.

Environmental Health 40c,d. Operations Research in Environmental Health

Lectures and computer exercises. Three hours a week, time to be arranged, third and fourth periods. Dr. Harrington.

Credit 3 units.

An introduction to concepts of operations research and computer techniques, applied to problems of environmental health sciences and engineering. Topics include the following: systems analysis of air and water treatment processes; mathematical techniques of optimization — Lagrangian methods, linear and non-linear programming, queueing theory, statistical decision theory; design of experiments for quality control of air, water and food.

Prerequisites: Admission subject to approval of instructor. Math. 20b, or equivalent, is desirable.

DEPARTMENT OF INDUSTRIAL HYGIENE

Leslie Silverman, s.b., s.m., s.m. in eng., s.d., *Professor of Engineering in Environmental Hygiene* and *Head of the Department*

Charles R. Williams, a.b., a.m., ph.d., *Professor of Applied Industrial Hygiene*

George F. Wilkins, a.b., m.d., *Associate Clinical Professor of Occupational Medicine*

Melvin W. First, s.b., s.m., s.d., *Associate Professor of Applied Industrial Hygiene*

Jacob Shapiro, s.b., s.m., ph.d., *Assistant Professor of Biophysics in Environmental Hygiene*

William A. Burgess, s.b. in m.e., s.m., *Assistant Professor of Environmental Health and Safety Engineering*

Robert E. Yoder, s.b., s.d. in hyg., *Assistant Professor of Radiological Hygiene*

Frederick J. Viles, Jr., s.b., s.m., *Research Associate and Lecturer in Industrial Hygiene*

Allen D. Brandt, s.b., s.m., s.d., *Visiting Lecturer on Industrial Hygiene Engineering*

Nathan Van Hendricks, b.e., chem.e., *Visiting Lecturer on Industrial Hygiene Engineering*

Lawrence S. Cooke, *Visiting Lecturer on Illumination*

James M. Austin, b.a., m.a., s.d., *Visiting Lecturer on Meteorology and Air Pollution*

Horace W. Gerarde, s.b., s.m., m.d., ph.d., *Visiting Lecturer in Industrial Toxicology*

Charles A. Mitchell, s.b., s.m., *Assistant in Industrial Hygiene*

Harriet L. Hardy, a.b., m.d., *Lecturer on Medicine*

Albert O. Seeler, a.b., m.d., *Lecturer on Medicine*

The primary objective of this Department is to provide instruction and graduate research in the prevention and control of occupational disease. This is the historical objective and was the reason the Department was created over forty years ago. Another objective is to provide instruction and graduate research opportunities in the fields of air pollution control and radiological hygiene. The latter areas are related to the teaching efforts of the Department in the Division of Environmental Health Sciences and Engineering, providing instruction in the School of Public Health. Our

faculty and staff offer courses for students in the Division of Engineering and Applied Physics of the Graduate School of Arts and Sciences.

Courses offered by the Department are open to physicians, engineers, physicists, chemists and biology majors. The basic course, Industrial Hygiene 1c,d, is for physicians as well as students with non-medical backgrounds. It covers the basic problems of Industrial Hygiene and Industrial Environments. Additional emphasis on Industrial Toxicology and Environmental Physiology is provided by the Department of Physiology. The Department of Physiology faculty provides a portion of the instruction in occupational health and industrial medicine. Industrial Hygiene 1c,d is the principal elective course for Master of Public Health candidates. It is also a basic course for Master of Industrial Health and Master of Science in Hygiene concentrators. The course in Industrial Air Analysis is required for the Master of Industrial Health and Master of Science in Hygiene programs, and is available to Master of Public Health candidates.

The other courses offered by the Department require prerequisites in various categories. It is desirable that all concentrators in this Department have a basic background in chemistry, physics and mathematics through calculus. Some of the courses in the Department carry "Engineering" numbers and provide direct course credit through the Division of Engineering and Applied Physics. Courses in air pollution and radiological hygiene are presented as inter-departmental courses by faculty from this Department. The material presented in lectures is supplemented with laboratory work as well as field observation.

The field of Industrial Hygiene and Occupational Health must keep pace with the numerous changes taking place in industry from year to year. Therefore, it should be evident that the subject material and course content will vary from year to year as the changes take place in industry and industrial practice.

A number of graduate level courses are offered to those wishing to pursue work beyond the master's degree. These are available to students in the School of Public Health as well as students in the Division of Engineering and Applied Physics. Research opportunities are available for projects in the three fields outlined above and a number of research fellowships and traineeships are available for qualified candidates.

Industrial Hygiene 1c,d. Basic Problems in Occupational Health and Industrial Environments

Lectures, laboratories, demonstrations and field trips. *Tuesdays and Thursdays, 8:30–10:30, third period; Mondays and Fridays, 10:30–12:30, fourth period; Wednesdays, 1:30–5, third and fourth periods.* Dr. Silverman, Dr. Ferris and Dr. Seeler.

Credit 7 units.

A course of lectures, demonstrations and inspections showing the relation of working conditions to health with special reference to control of industrial hazards, and of adverse conditions of temperature and humidity, the prevention, diagnosis and treatment of industrial disability and diseases, and workmen's compensation. (This course is classified as Eng. 282.)

Industrial Hygiene 2a,b. Industrial Air Analysis

Laboratory work. *Tuesdays and Thursdays, 1:30–4:30, first and second periods.* Mr. Viles and Dr. Williams.

Credit 4 units.

Determination and interpretation of adverse conditions found in work places of all types, such as factories and mills, and in assembly halls; methods employed in determining physical properties of the air, such as temperature, humidity, and air motion; atmospheric impurities and normal constituents of the air — gases, dusts, bacteria, and pollens; efficiencies of protective devices such as masks and respirators.

Course 2a,b (Eng. 281) is intended for public health engineers and physicians enrolled in the Industrial Health program.

Industrial Hygiene 6a,b (Engineering 280). Industrial Ventilation and Air Conditioning

Lectures and laboratories. Two hours of lectures, three hours of laboratory a week, time to be arranged, first and second periods. Assistant Professor Burgess and Dr. First.

Credit 4 units.

Selected topics in industrial ventilation and air conditioning of interest to students in mechanical and environmental health engineering and industrial hygiene. Primarily for engineers and physical science majors.

Industrial Hygiene 7c,d (Engineering 286). Aerosol Technology

Lectures and laboratory work, at the School of Public Health. Two hours of lectures, three hours of laboratory a week, time to be arranged, third and fourth periods. Dr. Yoder.

Credit 4 units.

A general discussion of aerosol properties and their behavior. An advanced course for engineers interested in air pollution evaluation and control.

Prerequisite: Industrial Hygiene 2a,b.

Industrial Hygiene 8c,d (Engineering 287). Radiological Engineering

Lectures. Given at the School of Public Health. Four hours a week, time to be arranged, third and fourth periods. Dr. Shapiro.

Credit 4 units.

A presentation of the basic theory and calculations utilized in radiation control and nuclear safety. Introduction to reactor physics; safeguards for preventing criticality and reactor accidents; radiation shielding; radiation damage; environmental reactor hazard analysis.

Prerequisites: Physics 101, Physics 111 or Environmental Health 2a,b.

Industrial Hygiene 17a,b,c,d,e.

Tutorial Program (Reading or Research). Time and credit to be arranged.

Reading or research assignments for individual tutorial work at a Master's degree level will be provided for qualified students in the fields of industrial hygiene, industrial ventilation, aerosol technology, radiological hygiene and air pollution control. Enrollment will be made by arrangement with the Head of the Department.

Industrial Hygiene 20. Research

Properly qualified students at the post-master's level or who have been accepted as doctoral candidates will be given opportunity to pursue independent research work on problems of industrial hygiene including occupational disease, toxicology, industrial ventilation, aerosol technology, air pollution control and radiological hygiene. Enrollment will be by arrangement with the Head of the Department.

DEPARTMENT OF PHYSIOLOGY

James L. Whittenberger, s.b., m.d., a.m. (hon.), *James Stevens Simmons Professor of Public Health, Professor of Physiology* and *Head of the Department*

Ross A. McFarland, a.b., ph.d., s.d. (hon.), *Daniel and Florence Guggenheim Professor of Aerospace Health and Safety*

Jere Mead, s.b., m.d., *Associate Professor of Physiology*

Benjamin G. Ferris, Jr., a.b., m.d., *Associate Professor of Environmental Health and Safety*

Edward P. Radford, Jr., m.d., *Associate Professor of Physiology*

Mary O. Amdur, s.b., ph.d., *Associate Professor of Toxicology*

William H. Forbes, a.b., a.m., dr.phil., m.d., *Lecturer on Physiology*

Harben J. Boutourline-Young, m.b.,b.s., d.c.h., m.d., *Research Associate in Physiology* (Absent 1964–65)

N. Robert Frank, a.b., m.d., *Assistant Professor of Physiology*

Sheldon D. Murphy, s.b., ph.d., *Assistant Professor of Toxicology*

Roland C. Moore, a.b., a.m., ph.d., *Associate in Industrial Psychology*

HOWARD W. STOUDT, JR., A.B., A.M., PH.D., S.M. IN HYG., *Associate in Physical Anthropology*

HERVEY B. ELKINS, A.B., PH.D., *Lecturer on Industrial Toxicology*

JOHN B. LITTLE, A.B., M.D., *Instructor in Radiobiology*

NORMAN H. MACKWORTH, M.B.,CH.B., PH.D., *Senior Research Associate in Physiological Psychology*

JOHN M. TYLER, A.B., M.D., *Research Associate in Physiology*

THOMAS J. CROWLEY, S.B., S.M., *Research Associate in Environmental Health and Safety*

DOROTHY B. CHAMBERLIN, S.B., M.D., M.P.H., *Research Associate in Physiology*

VILMA R. HUNT, B.D.S., M.A., *Research Associate in Physiology*

RONALD M. PICKETT, A.B., A.M., PH.D., *Research Associate in Experimental Psychology*

MARY E. BECK, A.B., M.D., *Research Fellow in Physiology*

LEONARD I. KLEINMAN, A.B., M.D., *Research Fellow in Physiology*

GEORGE S. TUNE, B.A., DR.PHIL., *Research Fellow in Biotechnology*

DAVID E. LEITH, A.B., M.D., *Research Fellow in Physiology*

KIMIO KONNO, M.D., *Research Fellow in Physiology*

SERAFETTIN TOMBULOGLU, M.D., *Research Fellow in Physiology*

EIJI YOKOYAMA, M.D., DR.MED.SC., *Research Fellow in Physiology*

FRANCESCO P. SAIBENE, M.D., *Research Fellow in Physiology*

ELIHU A. CHANNIN, A.B., M.D., *Research Fellow in Physiology*

PETER T. MACKLEM, A.B., M.D., *Research Fellow in Physiology*

ROBERT G. MONROE, A.B., M.D., *Associate in Pediatrics at the Children's Hospital*

JOSEPH M. MILLER, A.B., M.D., M.P.H., *Instructor in Medicine*

The Department of Physiology is a medical science department with interests that extend into several aspects of public health, particularly environmental health. Personnel in the Department include physicians, physiologists, psychologists, physical anthropologists, health and safety specialists, toxicologists, and specialists in radiobiology, occupational medicine and aerospace health and safety. Students and Research Fellows come with similarly varied backgrounds, and the research activities of the Department reflect this broad range of interests.

A fundamental aim of the Department is to provide basic information on the relationship of man to his physical and chemical environment. An introduction to these concepts is presented in the semi-elective course Environ-

mental Health 1b that is offered by the Department. These concepts are examined in detail in specialized courses such as Environmental Physiology, Principles of Toxicology, Radiation Biology, and Human Factors in Occupational Performance and Safety. Specific research projects of members of the Department offer the qualified student an opportunity to gain experience in, and to develop a capacity for, critical evaluation of research methods and analysis.

The research programs include topics such as techniques of measuring respiratory function, effects of low-level ionizing radiation, human factors in transportation safety, effects of inhaled irritants on man and animals, causation of chronic non-specific respiratory disease, exercise and work physiology, and factors involved in fitting the machine and work environment to the capabilities of human performance. Increased laboratory and teaching space for these programs was provided by the completion of the Kresge Center for Environmental Health to which the Department moved in August, 1962.

International interests of the Department include a cross-cultural study in Italy and the United States of America that is concerned with environmental factors and their effect on growth and development of school-age children. Another study involves attempts to determine the causation of chronic non-specific respiratory diseases by comparing results obtained by comparable methods in various countries.

Physiology 1a,b. Human Physiology

Lectures, laboratory and demonstrations. *Tuesdays, 9:30–10:30, Thursdays, 9:30–11:30, first period; Tuesdays, 9:30–10:30, Thursdays, 8:30–10:30; second period.* Dr. Mead, Dr Frank and associates.

Credit 3 units.

This course is intended for students who lack a background in physiology. The time will be divided approximately equally among cellular physiology, organ and organ system physiology, and function of the total organism. The purpose of the laboratory exercises will be to give the students some experience with problems of observing living systems.

Prerequisites: College courses in physics, chemistry and mathematics.

Physiology 2b. Environmental Physiology

Lectures and conferences. *Tuesdays, 4:30–5:30 and Thursdays, 11:30–12:30, second period.* Dr. Forbes.

Credit 1 unit.

This course is intended for students specializing in occupational health and will take up in greater detail some of the subjects considered in Environmental Health 1b.

In general students who take Environmental Health 1b should not take Physiology 2b.

The course will begin with a discussion of natural and artificial environments with particular reference to industrial workers. It will then take up human tolerance of high and low temperatures, physical fitness and its measurement, muscular work and the efficiency of various types of muscular work in industry, fatigue, and the effects of age.

Master of Science in Hygiene candidates who wish to take this course must have had Physiology 1a,b or the equivalent.

Physiology 3c,d. Principles of Toxicology

Lectures and laboratory work. *Wednesdays, 3:30–4:30, Fridays, 1:30–4:30, third period; Wednesdays and Fridays, 3:30–4:30, fourth period.* Dr. Amdur, Dr. Murphy and Dr. Radford.

Credit 2.5 units.

This course will present an introduction to the effects of toxic chemical agents on living organisms with particular reference to experimental techniques of assessing toxicity. Several classes of toxic agents will be studied with respect to mechanisms of action on living tissues, functional changes resulting from exposure, and methods of evaluating the damage produced.

Prerequisite: Physiology 1a,b or equivalent.

Physiology 4d. Special Topics in Respiratory Physiology

Lectures. Two hours a week, time to be arranged, fourth period. Dr. Mead and associates.

Credit 1 unit.

This course will cover special topics in respiratory physiology, according to the interests of the students. It is intended primarily for students in the aviation medicine program. Other students who are specializing in environmental health may enroll with the consent of the instructor.

Physiology 5c,d. Radiation Biology

Lectures and laboratory work. *Lectures, Tuesdays and Thursdays, 3:30–4:30, third and fourth periods; Laboratory, Mondays, 1:30–4:30, third and fourth periods.* Dr. Radford.

Credit 3 units.

This course will deal with the biological effects of ionizing radiation. Included will be discussion of radiation biochemistry, mutagenic properties of radiation, acute vs. chronic effects and characteristics of internal and external radiation exposure. During this period students will carry out radiobiological experiments in the laboratory.

Prerequisites: Environmental Health 2a,b, Physiology 1a,b, or equivalents.

Physiology 17a,b,c,d,e. Tutorial Program

Time and credit to be arranged.

Opportunities are provided for tutorial work at a master's degree level in the fields of respiratory physiology, toxicology, environmental hygiene and occupational medicine.

Physiology 20. Research

Doctoral candidates and other properly qualified students may undertake laboratory or field research by arrangement with the Head of the Department.

DEPARTMENT OF SANITARY ENGINEERING

HAROLD A. THOMAS, JR., S.B., S.M., S.D., *Gordon McKay Professor of Civil and Sanitary Engineering* and *Acting Head of the Department*

GORDON M. FAIR, S.B., S.M. (hon.), DR. ING. (hon.), DR. (hon.), SC.D. (hon.), *Abbott and James Lawrence Professor of Engineering, Gordon McKay Professor of Sanitary Engineering*

J. CARRELL MORRIS, S.B., A.M., PH.D., A.M. (hon.), *Gordon McKay Professor of Sanitary Chemistry* (Absent 1964–65)

WERNER STUMM, DR.PHIL., A.M. (hon.), *Associate Professor of Applied Chemistry*

CHARLES WALCOTT, A.B., PH.D., *Assistant Professor of Applied Biology*

MYRON B. FIERING, A.B., S.M., PH.D., *Assistant Professor of Engineering and Applied Mathematics*

JOSEPH J. HARRINGTON, B.C.E., A.M., PH.D., *Assistant Professor of Environmental Health Engineering*

RICHARD L. WOODWARD, B.S.C.E., S.M., PH.D., *Senior Research Associate and Lecturer in Sanitary Engineering*

EDWARD W. MOORE, A.B., S.M., *Lecturer on Sanitary Engineering*

H. NUGENT MYRICK, S.B., S.M., D.SC., *Instructor in Sanitary Engineering*

ELISABETH A. M. STUMM, DR.PHIL., *Research Associate in Applied Biology*

See listing of Environmental Health Courses on page 41 for offerings of this Department in the School of Public Health (Environmental Health 1d and 40c,d).

The following courses of instruction offered in the Division of Engineering and Applied Physics of the Graduate School of Arts and Sciences are open to properly qualified students:

Engineering 250a. Design of Water Resource Systems. Professor THOMAS.

Engineering 250b. (formerly Engineering 273). Design of Water Resource Systems. Professor Thomas.
Engineering 270a. Water Resource Engineering. Professor Fair.
Engineering 270b. Water Resource Engineering. Professor Fair.
Engineering 271a. Water Chemistry. Associate Professor Stumm.
Engineering 271b. (hf) Processes in Water and Waste Treatment. Dr. Myrick.
Engineering 272b. Chemistry and Biology of Natural Waters. Associate Professor Stumm and Assistant Professor Walcott.
Engineering 275. Seminar: Industrial Water and Wastes. Mr. Moore.
Engineering 276. Advanced Techniques for Water Analysis. Associate Professor Stumm. (To be omitted in 1964–65)
Engineering 277. Surface Chemistry. Associate Professor Stumm.
Engineering 278. Rate Processes. Professor Morris. (To be omitted in 1964–65)
Engineering 288. Biological Systems. Assistant Professor Walcott.
Engineering 289. Applied Electrochemistry. Associate Professor Stumm. (To be omitted in 1964–65)
Engineering 292. Chemistry of Nuclear Materials. Dr. Woodward.

DEPARTMENT OF BIOSTATISTICS

Robert B. Reed, a.b., a.m., ph.d., a.m. (hon.), *Professor of Biostatistics* and *Head of the Department*

Jane Worcester, a.b., dr.p.h., *Professor of Biostatistics and Epidemiology*

Lenin A. Baler, a.b., a.m., ph.d., s.m. in hyg., s.d. in hyg., *Assistant Professor of Mental Health*

David M. Heer, a.b., a.m., ph.d., *Assistant Professor of Biostatistics and Demography*

Margaret E. Drolette, a.b., m.p.h., *Associate in Biostatistics*

Marvin N. Glasser, b.b.a., m.p.h., s.d. in hyg., *Associate in Biostatistics and Epidemiology*

Paul M. Densen, a.b., s.d., *Visiting Lecturer on Biostatistics*

Anthony F. Bartholomay, a.b., a.m., s.d. in hyg., *Assistant Professor of Mathematical Biology in the Department of Medicine*

The teaching aims of the Department may be divided very generally into three categories:

First, it is essential for workers in all branches of public health to be able to draw justified conclusions from numerical data and to base logical action

on these conclusions. This applies to the administrator who must evaluate problems and the results of his activities, as well as to the epidemiologist and the research worker who must apply statistical technics to their laboratory and field problems. The required course in Biostatistics is therefore designed to give a minimum command of simple statistical methodology to all students.

Second, it is essential for field and laboratory researchers to be able to use statistical methods in planning and analyzing their experiments and problems. Elective courses are designed to provide an introduction to methodology in this area. These courses are adapted to the needs of students of this School, many of whom have broad backgrounds in biological sciences while few have extensive preparation in mathematics. A minimum of mathematical exposition is therefore included in courses intended for students in these categories. Instead the emphasis is on understanding the statistical procedures and the ability to carry out indicated analyses effectively.

Third, there is a smaller group of students particularly interested in pursuing further work along mathematical lines. Their requirements are fulfilled, on the one hand, by the provision of advanced and seminar courses in the Department; on the other, by the offerings of the Department of Statistics in the Graduate School of Arts and Sciences. Students with mathematical backgrounds who are working in biology, or medical scientists with an understanding of basic mathematics, will be interested in the teaching and research program in Mathematical Biology offered by Dr. Bartholomay at the Medical School. Properly qualified students at the School of Public Health may arrange for instruction in this area of knowledge.

Training in the use of data processing equipment is available in the Data Processing Center operated by the Department. This Center is equipped with an IBM 1620 Computer and basic punch card machines including a 101 Statistical Sorter. The University Computer Center, located in Cambridge and equipped with an IBM 7094 Computer, also provides an opportunity to study computer technics.

Biostatistics 1a,b. Principles of Biostatistics

Lectures and discussions. *Tuesdays and Thursdays, 8:30–9:30, first and second periods.*

Laboratory. *Mondays, 1:30–4:30, first and second periods.* Staff of the Department.

Credit 3.5 units.

Required of Master of Public Health candidates.

This course is designed for candidates with medical background or other similar thorough preparation in the biological sciences (for the introductory course for other candidates, see page 39). Lectures, discussions and laboratory exercises introduce the student to demographic concepts: the structure

of the population and the use of the life table; the nature and composition of rates and their use from administrative and epidemiological points of view. The course forms an introduction to the theory of measurements and distributions, including the testing of significance of differences and the interaction of variables. Finally, the student is introduced to basic concepts of probability and association, sampling technics and construction of controlled experiments such as clinical trials.

Biostatistics 2c,d. Statistical Methods in Research

Lectures, discussions and laboratory. *Tuesdays and Thursdays, 1:30–4:30, third and fourth periods.* Dr. Reed and Dr. Worcester.

Credit 4 units.

This course, a continuation of Biostatistics 1a,b, introduces the student to technical statistical procedures important in problems of laboratory and field research. Topics included are further considerations of probability and correlation together with an introduction to procedures used in the planning of experiments including variance analysis, non-parametric methods, dosage response and maximum likelihood. Statistical technics introduced in advanced courses in epidemiology will be amplified and supplemented.

Prerequisites: Basic preparation in statistics and epidemiology.

Biostatistics 15a,b,c,d. Design of Investigations

Seminars. *Wednesdays, 1:30–3:30, all four periods.* Staff of the Department.

Credit 1 unit in each period.

This course is for students with a major interest in biostatistics. Participants will select a biostatistical problem in apparent need of investigation, and will prepare and present for group discussion a summary of the present status of knowledge of the problem and the design of a study directed towards advancement of present knowledge. Given in conjunction with Epidemiology 15a,b,c,d.

Admission subject to the approval of the Head of the Department.

Biostatistics 17a,b,c,d,e. Tutorial Program

Time and credit to be arranged.

An opportunity for tutorial work at master's level will be given interested students. This will involve not only work in statistical fields, but can include problems arising in the course of special programs in other departments. Schedules and credit may therefore be arranged jointly with such other departments.

During the week of February 1 to February 6, 1965, opportunity will be

provided for studying the use of the equipment of the School's Data Processing Center. Emphasis will be placed on instruction in Fortran programming for the IBM 1620 Computer.

Biostatistics 20. Research

Individual guided research at doctoral level, for candidates for the Doctor of Public Health, Doctor of Science in Hygiene or other doctoral degrees. The work may be part of the program for a doctorate in this Department or may be integrated with doctoral research in other departments.

DEPARTMENT OF DEMOGRAPHY AND HUMAN ECOLOGY

Roger Revelle, A.B., PH.D., SC.D. (hon.), *Richard Saltonstall Professor of Population Policy* and *Director of the Center for Population Studies* (from October, 1964)

John C. Snyder, A.B., M.D., LL.D., *Henry Pickering Walcott Professor of Public Health* and *Acting Chairman of the Department*

William H. Forbes, A.B., A.M., DR.PHIL., M.D., *Lecturer on Physiology, Assistant to the Dean,* and *Faculty Advisor to Foreign Students*

John B. Wyon, B.A., M.B.,B.CH., M.P.H., *Assistant Professor of Population Studies*

David M. Heer, A.B., A.M., PH.D., *Assistant Professor of Biostatistics and Demography*

Stephen J. Plank, PH.B., A.B., M.D., M.P.H., DR.P.H., *Assistant Professor of Population Studies*

Ansley J. Coale, A.B., A.M., PH.D., *Visiting Lecturer on Demography*

Robert G. Potter, Jr., A.B., A.M., PH.D., *Research Associate in Demography*

The past decade has been marked by the emergence of many new nations and the achievement of self government by a considerable proportion of the population of the world. With these changes have come insistent demands for economic development, for better standards of living, for education, and for improved health conditions. In regions where health measures have been introduced with success, the effects on mortality rates have been striking but birth rates have not decreased concomitantly. The conviction is spreading that the effective application of public health measures in certain areas will result in increases in the population density of such magnitude that economic and social advances will be vitiated.

The Harvard School of Public Health has been involved in studies on population problems since 1953 through an investigation conducted by its Department of Epidemiology in collaboration with the Government of India, the Ludhiana Christian Medical College, and The Rockefeller Foundation.

These initial efforts have strengthened the view that our current knowledge concerning the basic factors which determine changes in the density and quality of populations is inadequate. It is the conviction of the administration of the Harvard School of Public Health that schools of public health and their parent universities should participate actively in the search for the knowledge which communities and nations must have in order to advance towards their goals in education, economic development and health. With this responsibility in mind, the administration of the School has concluded that population problems are foremost among the subjects appropriate for study by the profession of public health. As a step toward meeting this responsibility, a new department was established in the Faculty of Public Health in 1962–63 to conduct research and to provide instruction in population problems and those aspects of human ecology which are related to man's efforts to control and change his biophysical and social environment. When adequate financial support has been obtained, the new department will include experts in the biological and social sciences as well as representatives of the public health sciences. The department will be an integral part of the University-wide Center for Population Studies.

The activities of the Department of Demography and Human Ecology will be international in scope, and, as in other departments in the Faculty of Public Health, will be concerned with the advancement of knowledge through observation and experiment, placing emphasis partly on the acquisition of knowledge for its own sake and partly on the application of knowledge for the accomplishment of social goals. The development of the courses of instruction which are listed below is the initial step toward a more comprehensive academic program. The formal courses and the tutorial instruction are intended to provide students with an understanding of the interactions between demographic change and health objectives, and to prepare them for effective participation in population programs in various regions, whether as administrators, research workers, or educators.

Demography and Human Ecology 40a,b. Introduction to Ecology and Demography

Lectures, seminars and laboratory exercises. *Fridays, 1:30–3:30, first and second periods.* Dr. Wyon, Dr. Heer, Dr. Plank and associates.

Credit 2 units.

In the first part of the course the concept of ecology is developed through studies of plant and animal populations. Application is made to man and his environment. Man is viewed as part of an ecosystem. Factors limiting populations are discussed, and the idea of an ecological concept of cause is developed.

The second part of the course deals with the materials and methods of the demographic study of populations. Particular emphasis is given to measuring

the determinants of population change and the effect of the determinants on population composition and population growth.

Demography and Human Ecology 41c,d. Problems of Rapid Population Growth

Seminars. Two hours a week, time to be arranged, third and fourth periods. Staff of the Department.

Credit 2 units.

This course applies the concepts of ecology to human populations. The subjects include population theories, the determinants and effects of population growth, the principles of human reproduction, and the processes of family building. Small populations are considered with special emphasis on the perceptions of the individuals within these populations and their reactions to their own problems. Attention is directed to identification of the principal factors influencing population problems in areas of the world of direct concern to the students enrolled in the course.

Admission is limited to ten students and is subject to approval of Department staff.

Prerequisite: Demography and Human Ecology 40a,b.

Demography and Human Ecology 42b. Demographic Techniques

Lectures. *Tuesdays, 3:30–5:30, second period.*

Laboratory. *Fridays, 3:30–5:30, second period.* Dr. Heer.

Credit 1.5 units.

A course on demographic techniques with emphasis on the correction of vital statistics and census data, measurement of nuptiality, fertility, contraceptive effectiveness and population growth, and on the preparation of population projections.

Prerequisite: Biostatistics 1a,b.

Demography and Human Ecology 17a,b,c,d. Tutorial Program

Time and credit to be arranged.

Students at the master's level may make arrangements for tutorial work and special reading on topics related to the causes or treatment of population problems. There may be an opportunity to consider the design of studies, programs or analysis of data.

Demography and Human Ecology 20. Research

Doctoral candidates may undertake research in the Department or may integrate research in this field with a doctoral program in another department.

Demography and Human Ecology 30e. Field Visits

February 1–February 6, 1965.

Credit 1 unit.

Students majoring in the Department of Demography and Human Ecology participate in field visits to the Demographic Section of the United Nations and to organizations and clinics which are currently active in family planning work.

Additional Field Study

At the end of the academic year a field visit to Puerto Rico is arranged for students majoring in the Department of Demography and Human Ecology. In collaboration with the University of Puerto Rico, an introduction to the demographic, social and economic history of the Island is provided, followed by personal observations of current programs of family planning and community education.

Limited to ten students.

In addition to the courses listed above, Dr. Heer will give a course in the Department of Social Relations of the Faculty of Arts and Sciences, as follows:

Social Relations 192. Problems of Population

Half course (spring term). M., W., F., at 9:00. Dr. David M. Heer.

This course will review the history of the world's population and the social consequences of different population sizes and growth rates. Special attention will be paid to a cross-cultural analysis of the social determinants of fertility, mortality and migration.

DEPARTMENT OF EPIDEMIOLOGY

GEORGE B. HUTCHISON, A.B., M.D., M.P.H., *Associate Professor of Epidemiology* and *Acting Head of the Department* (1964–65)

BRIAN MACMAHON, M.D., PH.D., D.P.H., S.M. IN HYG., *Professor of Epidemiology* and *Head of the Department*

JANE WORCESTER, A.B., DR.P.H., *Professor of Biostatistics and Epidemiology*

THOMAS F. PUGH, M.D., M.P.H., *Associate Professor of Applied Epidemiology*

ALBERT DAMON, A.B., PH.D., M.D., *Associate Professor of Epidemiology*

HERBERT L. LEY, JR., M.D., M.P.H., *Associate Professor of Epidemiology and Microbiology*

SAMUEL G. MCCLELLAN, A.B., M.D., M.P.H., *Lecturer on Applied Epidemiology*

ASCHER J. SEGALL, M.D., M.P.H., DR.P.H., *Assistant Professor of Epidemiology*

MARVIN N. GLASSER, B.B.A., M.P.H., S.D. IN HYG., *Associate in Biostatistics and Epidemiology*

MORRIS SIEGEL, M.D., M.P.H., *Visiting Lecturer on Epidemiology*

VAUN A. NEWILL, S.B., M.D., S.M. IN HYG., *Visiting Lecturer on Epidemiology*

EVA J. SALBER, M.B.,CH.B., D.P.H., M.D., *Senior Research Associate in Epidemiology*

THEODOR ABELIN, DR.MED., M.P.H., *Research Associate in Epidemiology*

MORTON A. LEVY, A.B., M.D., *Research Fellow in Epidemiology*

MANNING FEINLEIB, A.B., M.D., M.P.H., *Teaching Fellow in Epidemiology*

LOUIS WEINSTEIN, S.B., S.M., PH.D., M.D., *Lecturer on Infectious Diseases*

HENRY WECHSLER, A.B., A.M., PH.D., *Research Associate in Psychology in the Department of Psychiatry*

The formal courses offered by the Department of Epidemiology are designed primarily for the Master of Public Health curriculum. Epidemiology 1a,b deals with epidemiologic principles and methods as they apply to all varieties of disease, infectious and non-infectious, acute and chronic. Systematic reviews of the infectious diseases are given in Microbiology and Tropical Public Health 1a,b,c and of the non-infectious diseases in Epidemiology 2c,d. Epidemiology 3b, 4c,d and Epidemiology and Microbiology 5d are elective courses for students with special interests.

A major objective of the Department is to encourage original investigation in epidemiology. In addition to tutorial work in a specific research problem (Epidemiology 17), opportunity for experience in study design is provided in Epidemiology 15.

A training program in epidemiology supported by the National Institutes of Health, U.S. Public Health Service, provides opportunities for training in epidemiology at a variety of levels (see page 102). In the selection of graduate candidates for this program, preference will be given to those intending to proceed to investigative work at the doctoral level.

Epidemiology 1a,b. Principles of Epidemiology

Lectures. *Tuesdays, 9:30–10:30, Thursdays, 9:30–11:30, first period; Tuesdays and Thursdays, 9:30–10:30, second period.* Dr. HUTCHISON and associates.

Credit 2.5 units.

Required of Master of Public Health candidates.

Lectures on the principles, purposes and methods of epidemiology. Illustration is by reference to classic epidemiologic investigations and through laboratory exercises.

Epidemiology 2c,d. Epidemiology of Non-Infectious Disease

Lectures. *Mondays, Wednesdays, and Fridays, 8:30–9:30, third period; Mondays and Wednesdays, 8:30–10:30, fourth period.* Dr. HUTCHISON and associates.

Credit 3 units.

One of the six semi-elective courses from which Master of Public Health candidates are required to elect a minimum of 12.5 credit units.

A course concerned with the etiology of those diseases not at present known to be associated with infectious agents. Special attention is given to the mental disorders, to the degenerative and neoplastic diseases, and to the methodologic difficulties associated with the epidemiologic investigation of chronic diseases. Through illustrative studies, problems such as the establishment of criteria for definition, the description of disease course, and the investigation of causal relationships extending over long time periods are discussed. Systematic reviews of the present state of knowledge regarding certain disease states are presented.

Epidemiology 3b. Clinical Problems in Infectious Disease

Lectures and clinics. *Tuesdays, 4–6, second period.* Dr. WEINSTEIN.

Credit 1 unit.

Problems of diagnosis, treatment and control of the common acute communicable diseases of temperate climates.

Epidemiology 4c,d. Human Heredity

Lectures. *Tuesdays and Thursdays, 4:30–5:30, third and fourth periods.* Dr. HUTCHISON.

Credit 2 units.

Lectures on the methodology of investigating problems of human heredity and on the current state of knowledge of certain specific areas in this field. Introductory lectures will review the principles of classical genetic theory with particular emphasis on theory peculiar to human genetics.

The methods for investigating family patterns of heredity, twin studies, effects of consanguinity and heterosis, gene linkage and the inheritance of continuous traits, such as height and IQ, will be presented. Students will be given problems illustrating these methods. Current knowledge of the heredity of such factors as mongolism, pyloric stenosis, and the human blood groups will be reviewed.

Epidemiology and Microbiology 5d. Epidemiologic Problems in Infectious Disease

Conferences, seminars, laboratory exercises. *Mondays and Wednesdays, 10:30–12:30, fourth period.* Dr. Ley and associates.

Credit 2 units.

A course given by the staffs of the Departments of Microbiology, Epidemiology and Tropical Public Health providing experience in solving epidemiologic problems in communicable disease.

Epidemiology 15a,b,c,d. Design of Investigations

Seminars. *Wednesdays, 1:30–3:30, all four periods.* Staff of the Department.

Credit 1 unit in each period.

This course is for students with a major interest in epidemiology. Participants will select an epidemiologic problem in apparent need of investigation, and will prepare and present for group discussion a summary of the present status of knowledge of the problem and the design of a study directed towards advancement of present knowledge. Given in conjunction with Biostatistics 15a,b,c,d.

Admission subject to the approval of the Head of the Department.

Epidemiology 17a,b,c,d,e. Introduction to Research

Participation in departmental research in close association with a staff member. Time and credit by arrangement with the Head of the Department.

Prerequisite: Epidemiology 15.

Epidemiology 20. Research

Research for doctoral candidates.

DEPARTMENT OF MATERNAL AND CHILD HEALTH

William M. Schmidt, s.b., m.d., a.m. (hon.), *Professor of Maternal and Child Health* and *Head of the Department*

Elizabeth P. Rice, a.b., s.m., *Associate Professor of Public Health Social Work*

Leon Sternfeld, s.b., m.d., ph.d., m.p.h., *Associate Professor of Applied Maternal and Child Health* and *Deputy Commissioner of Health, Commonwealth of Massachusetts*

Isabelle Valadian, m.d., m.p.h., *Assistant Professor of Maternal and Child Health*

Harold Jacobziner, s.b., m.d., m.p.h., *Visiting Lecturer on Maternal and Child Health*

Arthur J. Lesser, a.b., m.d., m.p.h., *Visiting Lecturer on Maternal and Child Health*

Samuel B. Kirkwood, a.b., m.d., s.d. (hon.), *Visiting Lecturer on Maternal Health*

Edwin M. Gold, s.b., m.d., *Visiting Lecturer on Maternal and Child Health*

Alan F. Guttmacher, a.b., m.d., *Visiting Lecturer on Maternal Health*

Helen D. Cohn, m.p.h., *Instructor in Applied Public Health Nursing*

Derek Robinson, m.b.,ch.b., d.p.h., d.c.h., m.d., *Instructor in Maternal and Child Health*

Ilse E. Gorbach, a.b., m.d., m.p.h., *Instructor in Child Health*

Benjamin Sachs, a.b., m.d., m.p.h., *Instructor in Maternal and Child Health*

Arthur J. Salisbury, s.b., m.d., m.p.h., *Instructor in Child Health*

Ruth M. Butler, a.b., s.m., *Milton Research Associate in Social Work*

Sylvia G. Krakow, s.b., m.s.w., d.s.w., *Research Associate in Social Work*

Miriam C. Ekdahl, s.b., s.m. in s.s., *Assistant in Social Work*

Ruth A. Cowin, s.b., s.m., *Assistant in Social Work*

Charles A. Janeway, a.b., m.d., a.m. (hon.), *Thomas Morgan Rotch Professor of Pediatrics*

Duncan E. Reid, s.b., m.d., a.m. (hon.), *William Lambert Richardson Professor of Obstetrics*

Clement A. Smith, a.b., a.m., m.d., a.m. (hon.), s.d. (hon.), *Professor of Pediatrics at the Boston Lying-In Hospital*

William Berenberg, a.b., m.d., *Assistant Clinical Professor of Pediatrics*

Lendon Snedeker, a.b., m.d., m.p.h., *Instructor in Pediatrics*

The teaching program in the Department is designed to present the content of Maternal and Child Health and Crippled Children's Services: the needs to be met by such services, the problems affecting the health and well-being of mothers and children, the major program aims, and the methods of administration of health and welfare services.

First, it provides to students in all branches of public health the basic principles underlying the protection of mothers during maternity and of normal and handicapped children. Emphasis is based on total health needs, physical, social, and emotional. Knowledge of health measures and of community services for children and families is also presented.

Second, it provides to students interested in studying maternal and child health more intensively, further knowledge of health problems in this field and the programs and methods developed to serve mothers and children. Program planning, principles of organization, procedures and administration of Maternal and Child Health Services, including organized care of handicapped children, are analyzed. Each student who concentrates in the Department is expected to pursue an independent study of some aspect of maternal and child health which is presented and discussed by the faculty and students in the Department.

Third, it provides to Maternal and Child Health students in doctoral programs, tutorial sessions and guidance with respect to their original investigations in Maternal and Child Health.

Fellowships are available for physicians who have a major interest in Maternal and Child Health. (See Page 102.)

Maternal and Child Health 1c. Principles of Maternal and Child Health

Lectures. *Mondays and Fridays, 10:30–12:30, third period.* Dr. Schmidt and associates.

Credit 2 units.

One of the six semi-elective courses from which Master of Public Health candidates are required to elect a minimum of 12.5 credit units.

This course presents a systematic review of the principles which underlie programs concerned with maternal and child health, handicapped children, and the related services of child welfare.

Maternal and Child Health 2c,d. Problems and Programs in Maternal and Child Health

Advanced Seminar. *Mondays, 3:30–5:30, third period; Wednesdays, 1:30–3:30, third and fourth periods; Fridays, 8:30–10:30, fourth period.* Dr. Schmidt, Miss Rice, Dr. Valadian and associates.

Credit 4 units.

Presentation and discussion of programs in maternal and child health and of services for handicapped children. Selected aspects of programs are

examined with particular reference to the methods of administration in relation to program goals.

A sequence of lecture and discussion sessions is included on social problems and available social services for children.

This course is an advanced course for students majoring in Maternal and Child Health but may be elected by other students with the permission of the Head of the Department.

Maternal and Child Health 3d. Research Approach to Growth, Development and Health of the Child

Seminars. Two hours twice each week, time to be arranged, fourth period. Dr. VALADIAN, Dr. REED and associates.

Credit 2 units.

This course deals with the methods for obtaining and evaluating data on child growth, development, and health, and the construction of norms. Particular attention is paid to problems involved in the study of interrelationships between various aspects of the child's progress and between the child and his background and environment.

Illustrative material from the Longitudinal Study of Child Health and Development conducted in this Department since 1930 by Dr. Harold C. Stuart, Professor *Emeritus,* as well as data from other studies in this country and abroad are used.

Admission open to any student subject to approval of instructor.

Maternal and Child Health 15a,b. Departmental Seminar

Seminars. *Wednesdays, 1:30–3:30, first and second periods.* Staff of the Department.

Credit 2 units.

Seminars on topics of special interest in maternal and child health. Presentations by students and by staff of subjects assigned for critical review. Students' previous experience, research in progress, and current reports in the literature will be drawn upon.

Required of students majoring in Maternal and Child Health.

Maternal and Child Health 17b,c,d,e. Tutorial Program

Time and credit to be arranged, second, third and fourth periods.

Students majoring in Maternal and Child Health will devote time to be arranged to individual work under guidance. Each program will be arranged between the student and advisor during the fall term, and approved in advance by the Head of the Department. In general, such studies will involve a review of the literature, field study, and a paper reporting on the work done.

Students not majoring in Maternal and Child Health may also elect to carry on a study in Maternal and Child Health with permission of the Head of the Department.

Maternal and Child Health 20. Research

Students at the doctoral level may undertake research in Maternal and Child Health by arrangement with the Head of the Department.

Field Study

Students who are accepted for admission and who do not have sufficient experience in Maternal and Child Health may be required to have a period of field study, usually not less than two months, before registration. Students will be encouraged to spend two months, at the end of the academic year, on a field assignment to be arranged for each student by the staff of the Department.

Other field experience may be arranged as time permits.

DEPARTMENT OF MICROBIOLOGY

Herbert L. Ley, Jr., m.d., m.p.h., *Associate Professor of Epidemiology and Microbiology* and *Chairman of the Department of Microbiology*

John C. Snyder, a.b., m.d., ll.d., *Henry Pickering Walcott Professor of Public Health*

Geoffrey Edsall, m.d., *Professor of Applied Microbiology* and *Superintendent of Institute of Laboratories, Department of Public Health of Massachusetts*

Edward S. Murray, a.b., m.d., m.p.h., *Associate Professor of Microbiology* and *Assistant Physician to University Health Services*

Samuel D. Bell, Jr., a.b., m.d., m.p.h., *Associate Professor of Microbiology* and *Assistant Physician to University Health Services*

Robert S. Chang, b.sc., m.d., s.d. in hyg., *Associate Professor of Microbiology*

Charlotte C. Campbell, s.b., *Associate Professor of Medical Mycology*

Robert A. MacCready, s.b., m.d., *Lecturer on Applied Microbiology* and *Director of Diagnostic Laboratories, Department of Public Health of Massachusetts*

Roger L. Nichols, a.b., m.d., *Assistant Professor of Applied Microbiology* (Absent 1964–65)

J. William Vinson, s.b., s.d. in hyg., *Research Associate in Microbiology*

Robert B. Pennell, s.b., s.m., ph.d., *Lecturer on Immunology*

Herald R. Cox, a.b., s.d., s.d. (hon.), *Visiting Lecturer on Microbiology*

Charles H. Rammelkamp, a.b., m.d., s.d. (hon.), *Visiting Lecturer on Microbiology*

KENNETH F. GIRARD, S.B., M.SC., PH.D., *Research Associate in Microbiology*

MARIA EBE RECA, DR.CHEM., *Research Associate in Medical Mycology*

DOROTHY E. MCCOMB, S.B., *Assistant in Microbiology*

JANE D. O'CONNOR, S.B., *Assistant in Microbiology*

LEO LEVINE, S.B., *Assistant in Microbiology*

GRACE C. YUAN, B.S., M.D., *Research Assistant in Microbiology*

I-HUNG PAN, DR.MED.SCI., *Research Fellow in Microbiology*

The Department of Microbiology is concerned with the bacteria, rickettsiae, and viruses which cause the principal communicable diseases of public health importance. The staff members have many interests in common with the Departments of Epidemiology and Tropical Public Health. The courses in microbiology are intended primarily for students with a background in the medical and biological sciences.

The basic course, Microbiology-Tropical Public Health 1 a,b,c is designed to provide the students in the Master of Public Health program with the factual information and the principles of microbiology and parasitology which are essential to a general understanding of the field of public health.

The advanced courses of the Department are planned for students whose major interests lie in some aspect of the communicable diseases. The titles and descriptions as listed below indicate the scope of the instruction offered by the Department.

Students who are interested in learning research technics and in undertaking original investigation may register for Microbiology 17 during their first year, or Microbiology 20 after they have acquired technical skill in handling pathogenic microorganisms. These two courses provide the opportunity to work in close association with a member of the staff on research problems in specific areas as listed under Course 20 below. Present Departmental interests include the rickettsiae and certain viruses; the biological aspects of host-parasite relations, and the properties of human cells in tissue culture; and immunological problems, including statistical and field assay technics. Entomological problems of certain types are also within the scope of the research interests and facilities of the Department.

A program supported by the National Institutes of Health is available to assist qualified applicants who desire training in infectious disease, including rickettsial, viral, bacterial and mycological infections.

Microbiology and Tropical Public Health 1a,b,c. Ecology and Epidemiology of Infectious Diseases

Lectures, seminars, conferences and laboratory exercises. *Tuesdays, 10:30–11:30, Wednesdays, 9:30–10:30, Thursdays, 11:30–12:30 and 1:30–4:30, first*

period; Tuesdays and Thursdays, 10:30–11:30, Wednesdays, 9:30–10:30, Thursdays, 1:30–4:30, second period; Mondays, Wednesdays and Fridays, 9:30–10:30, Tuesdays and Thursdays, 10:30–11:30, third period. Dr. WELLER, Dr. LEY and the Staff of the two Departments.

Credit 6 units.

One of the six semi-elective courses from which Master of Public Health candidates are required to elect a minimum of 12.5 credit units.

This course is under the general direction of Drs. Weller and Ley, with the collaboration of the staff of the Departments of Microbiology, Tropical Public Health and Epidemiology. The purpose of the course is to provide students in the Master of Public Health program with the basic knowledge of the communicable and infectious diseases, including the relevant ecologic factors which pertain directly to their prevention and control.

Microbiology and Tropical Public Health 1 a,b,c is designed for students who have had most of the courses given in the first two years of medical school or their equivalent. The exercises include discussions of the present status of infectious diseases in tropical and temperate climates and the technics available for study of microorganisms and parasites, with special reference to recent methods which have opened a new era in microbiology. The course emphasizes the principal diseases of public health importance. The subjects are presented by etiologic agent, including protozoa, helminths, viruses, rickettsiae, spirochetes and bacteria.

Approximately two-thirds of the time will be devoted to lectures and one-third to conferences, seminar discussions, and laboratory exercises. In the laboratory the student is expected to acquire an understanding of the potentialities as well as the limitations of pertinent public health laboratory procedures.

Microbiology 2d. Current Research in Microbiology

Tuesdays, 8:30–10:30, fourth period. Dr. SNYDER.

Credit 1 unit.

This course is arranged for the students who are concentrating in microbiology, epidemiology or tropical public health. Important papers from current periodicals on topics of general interest are assigned to the students for presentation. These papers are reviewed critically in respect to evaluation of the experimental work, analysis of the results, organization of the manuscripts, and clarity of presentation.

The purpose of the course is to develop the ability of the students to read the literature analytically and to plan their own work and manuscripts effectively.

Epidemiology and Microbiology 5d. Epidemiologic Problems in Infectious Disease

Conferences, seminars, laboratory exercises. *Mondays and Wednesdays, 10:30–12:30, fourth period.* Dr. Ley and associates.

Credit 2 units.

A course given by the staffs of the Departments of Microbiology, Epidemiology and Tropical Public Health providing experience in solving epidemiologic problems in communicable disease.

Microbiology 11c. Public Health Laboratory Procedures

Lectures, seminars, and laboratory exercises. *Mondays and Fridays, 1:30–4:30, Wednesdays, 3:30–4:30, third period.* Dr. Murray, Miss Campbell, Dr. Vinson, Dr. Ley and Dr. MacCready.

Credit 2 units.

This course provides the opportunity to become familiar with the technics in use by public health laboratories for the diagnosis of the common bacterial and viral diseases. Some of the exercises are devoted to methods recently developed for the study of various microorganisms. The exercises are designed for orientation of the epidemiologist as well as the microbiologist, with particular reference to the potentialities and limitations of laboratory technics in the conduct of field investigations of communicable diseases.

Short exercises illustrate the important principles of tests in serology and bacteriology, and the students themselves inoculate embryonated eggs and animals by various routes, prepare diagnostic antigens, and perform neutralization tests and red cell agglutination tests.

Limited to fourteen students who are enrolled in Microbiology-Tropical Public Health 1 a,b,c.

Microbiology 12c. Applied Immunology: Biological Products in Public Health

Seminars and laboratory demonstrations at the Institute of Laboratories of the Massachusetts Department of Public Health. Time to be arranged, third period. Dr. Edsall and Staff of the Institute of Laboratories.

Credit 1 unit.

This course deals with the immunological principles underlying the preparation, evaluation and use of serums, vaccines and other biologic products used in public health practice. The design and interpretation of laboratory and field tests of biologic products, the estimation of their safety and effectiveness, and related questions will be discussed. Each participant will present an oral and written report on a specific problem of current importance.

Opportunities are offered properly qualified students for original work at the Institute in problems of public health immunology with credit for Microbiology 17 or 20 to be arranged with the Head of the Department.

Microbiology 13d. Rickettsial and Viral Diseases of Public Health Importance

Lectures, laboratory exercises, and seminars. *Mondays and Fridays, 1:30–4:30, Wednesdays, 3:30–4:30, fourth period,* and three hours per week individual laboratory work. Dr. CHANG, Dr. BELL, Dr. MURRAY, Dr. VINSON and Dr. LEY.

Credit 3 units.

The purpose of this course is to teach the basic principles and technics for laboratory study of certain rickettsiae and viruses which are of interest to public health workers. The course consists of lectures, seminars, supervised individual work, and laboratory exercises. The latter include methods for identification of representative species of rickettsiae and viruses of public health importance by the use of tissue culture, animal inoculation, and serologic technics.

The arthropods which are vectors or reservoirs of the major viral and rickettsial diseases are briefly considered at appropriate points in the exercises.

The course is planned as a basic preparation for those who will be involved in original research on rickettsiae or viruses either in the laboratory or the field.

Limited to ten students who have completed Microbiology 11c or who have had equivalent previous preparation.

Microbiology 15a,b,c,d. Seminars in Microbiology

Seminars. *Wednesdays, 1:30–3:30, all four periods.*

Credit 1 unit in each period.

Seminars on topics of special interest in microbiology. These vary from presentations by students of subjects assigned for analysis and review to reports by staff members and advanced students of research work in progress in the Department.

This course is required for students majoring in microbiology.

Microbiology 17a,b,c,d,e. Introduction to Research

Time and credit to be arranged with the Department Staff.

Students without previous experience in research may register for supervised laboratory work in one of the areas listed under Course 20 below.

Microbiology 20a,b,c,d. Research

Doctoral candidates or full-time special students who have completed the advanced courses in microbiology in the Department may undertake original investigation by arrangement with the Head of the Department.

There are six general areas currently under investigation by members of the Department:

(a) Serological problems as studied by technics of fluorescent antibody, complement fixation, and immunoelectrophoresis (Dr. Murray and Dr. Nichols).

(b) Biologic studies of rickettsiae and the psittacosis-lymphogranuloma-trachoma viruses (Dr. Murray, Dr. Bell, Dr. Ley and Dr. Vinson).

(c) Virology and cell biology (Dr. Chang).

(d) Experimental infection of laboratory-reared lice and fleas (Dr. Murray and Dr. Vinson).

(e) Antigenic analysis of systemic pathogenic mycotic agents; ecologic and epidemiologic problems associated with systemic mycotic diseases and agents; microenvironmental studies on the systemic pathogenic fungi (Miss Campbell).

(f) At the Institute of Laboratories, Massachusetts Department of Public Health, students may participate in studies related to the development, preparation, testing, characterization and evaluation of biologic products, on the diagnosis of infectious disease, or the characteristics of infectious agents or on related aspects of epidemiology, microbiology and immunology (Dr. Edsall and Dr. Ley).

DEPARTMENT OF NUTRITION

Fredrick J. Stare, s.b., s.m., ph.d., m.d., a.m. (hon.), s.d. (hon.), *Professor of Nutrition* and *Head of the Department*

D. Mark Hegsted, s.b., s.m., ph.d., a.m. (hon.), *Professor of Nutrition*

Robert P. Geyer, s.b., s.m., ph.d., *Associate Professor of Nutrition*

Jean Mayer, b.a., b.sc., m.sc., ph.d., d.sc., *Associate Professor of Nutrition* and *Lecturer on the History of Public Health*

Martha F. Trulson, s.b., m.p.h., s.d. in hyg., *Associate Professor of Nutrition*

Stephen B. Andrus, s.b., m.d., *Assistant Professor of Pathology*

Stanley N. Gershoff, a.b., s.m., ph.d., *Assistant Professor of Nutrition*

Oscar W. Portman, s.b., m.d., *Assistant Professor of Nutrition*

Joseph J. Vitale, s.b., s.m., s.d. in hyg., *Assistant Professor of Nutrition*

Bernard Lown, s.b., m.d., *Assistant Professor of Medicine*

Robert B. McGandy, a.b., m.d., m.p.h., *Associate in Nutrition*

Madge L. Myers, a.b., s.m., *Instructor in Nutrition*

Patricia A. Stefanik, s.b., s.m., *Instructor in Nutrition*

Edwin L. Prien, a.b., a.m., m.d., *Clinical Research Associate in Nutrition*

Hernan Velez, m.d., *Clinical Research Associate in Nutrition*

F. Russell Olsen, a.b., *Research Associate in Nutrition*

MARIA BANASIĘWICZ, M.D., M.P.H., *Research Associate in Nutrition*
ROBERT E. CLANCY, M.D., *Research Associate in Medicine*
OSCAR M. JANKELSON, M.D., *Research Associate in Medicine*
CARL C. SELTZER, A.B., PH.D., *Research Associate in Physical Anthropology*
AGNES M. HUBER, B.SC., PH.D., *Research Associate in Nutrition*
ETHEL J. BOWIE, S.B., *Assistant in Nutrition*
DOROTHY BRUNO, S.B., *Assistant in Nutrition*
LENORE F. MONELLO, A.B., A.M., *Assistant in Nutrition*
SHEILA N. CRONIN, S.B., S.M., *Assistant in Nutrition*
ROBERT E. KLEIGER, A.B., M.D., *Research Fellow in Nutrition*
GERALD A. WOLFF, A.B., M.D., *Research Fellow in Nutrition*
HIROSHI OKANIWA, M.D., DR.MED.SC., *Research Fellow in Nutrition*
MICHAEL C. LATHAM, B.A., M.D., D.T.M.&H., *Research Fellow in Nutrition*
JAMES S. WILLIAMS, S.B., M.D., *Research Fellow in Nutrition*
MICHAEL A. ROSSI, S.B., M.D., *Research Fellow in Nutrition*
HIKARU KOIDE, M.D., *Research Fellow in Nutrition*

JAMES H. SHAW, B.A., S.M., PH.D., A.M. (hon.), *Associate Professor of Biological Chemistry in the School of Dental Medicine*
IRA GORE, A.B., M.D., *Lecturer on Pathology*
NORMAN ZAMCHECK, A.B., M.D., *Clinical Associate in Medicine*
EARL E. HELLERSTEIN, A.B., M.D., *Assistant Professor of Pathology*
DANIEL S. BERNSTEIN, A.B., M.D., *Instructor in Medicine*
HAROLD J. WHITE, S.B., M.D., *Instructor in Pathology*
ROBERT H. CRAIG, M.D., *Research Associate in Medicine*

The Department of Nutrition is concerned with basic and applied investigations in the science of nutrition in the areas of biochemistry, physiology, and pathology. Many of these are oriented toward problems of contemporary public health importance, such as cardiovascular disease, obesity, and cancer. The Department also has programs dealing with general nutritional and health problems in various countries in South America, Africa, and Asia.

In addition to the courses available in the School of Public Health, students may take graduate courses in the other Schools of Harvard University and at the Massachusetts Institute of Technology. Thus, a program leading to the Doctor of Science degree might include courses in nutrition, biochemistry, biostatistics and epidemiology, physiology, and bacteriology, as well as advanced courses in these and related fields, such as organic and physical chem-

istry and biology. Appropriate programs are available for individuals whose interests lie in community nutrition rather than in laboratory nutrition and biochemistry.

Nutrition 1a,b. Public Health Nutrition

Lectures. *Wednesdays, 10:30–12:30, first and second periods; Fridays, 11:30–12:30, first period.* Dr. STARE and Staff of the Department.

Credit 2.5 units.

One of the six semi-elective courses from which Master of Public Health candidates are required to elect a minimum of 12.5 credit units.

This course deals with the science of nutrition and its application to problems of human nutrition. Approximately one half of the lectures are devoted to basic and clinical nutrition. Dietary requirements are considered in relation to growth, development, pregnancy, lactation and disease states. Methods for establishing and meeting nutrition requirements, especially in countries with unfavorable economic conditions, are discussed. The etiology, treatment and prevention of diseases related to nutritional factors are considered. Content also includes nutrition surveys and their evaluation, the place of the nutritionist in the public health program, and the nutritional problems of relief, rehabilitation, famine and other emergencies. The relation of production, distribution and preparation for the best use of foods is discussed, as are the problems of food enrichment, fortification and faddism.

Seminar sessions are arranged for small groups. Active student participation is expected.

Nutrition 2c,d. Advanced Topics in Nutrition

Lectures, discussions and required reading. *Wednesdays, 1:30–3:30, third and fourth periods; Fridays, 8:30–10:30, fourth period.* Dr. HEGSTED, Dr. MAYER and Dr. GERSHOFF.

Credit 3 units.

The chemistry, function and metabolism of carbohydrates, fats, proteins, vitamins and essential minerals are considered in detail. Mechanisms of regulation and behavioral aspects of food and fluid intake, calorimetry, genetic factors in nutrition, comparative requirements of various species are examined.

This course is intended primarily for students majoring in nutrition but can be taken by other adequately prepared students by consent of the instructors.

Nutrition 3c,d. Laboratory Technics

Lectures and demonstrations. *Wednesdays, 3:30–5:30, third and fourth periods.* Dr. GEYER, Dr. PORTMAN and Dr. VITALE.

Credit 2 units. Additional credits can be arranged for those desiring extra laboratory instruction.

This course is a survey of methods pertinent to laboratory research. The material covered includes biophysical and chemical technics. Students participate in the preparation and presentation of such general topics as chromatography, spectroscopy, microbiological assay, manometric measurements, and purified diet technics. They are then instructed in the actual laboratory procedure pertaining to these technics.

Prerequisites: A basic course in biochemistry and consent of instructor.

Nutrition 5d. Nutritional Surveys

Lectures, discussions and laboratory exercises. Two hours a week, time to be arranged, fourth period. Dr. Trulson, Dr. Gershoff and Dr. McGandy.

Credit 1 unit.

Methods of obtaining dietary information, principle of nutritional surveys; assessment of nutritional status in public health programs and clinical research are examined and discussed. Laboratory work will consist of practical exercises in evaluating diets and surveys.

Nutrition 17a,b,c,d,e. Tutorial Program

Time and credit to be arranged.

Individual work, under direction, may be arranged for students at the master's level. This may include laboratory studies or projects in applied nutrition.

Nutrition 20. Research

Time and credit to be arranged.

Facilities are available for students at the doctoral level to do advanced work in nutrition along the lines of fundamental research or applied nutrition in public health and medicine.

Admission limited and subject to approval of the instructor.

Nutrition 40c,d. Nutritional Aspects of Human Disease

Lectures, discussions and demonstrations. *Thursdays, 3:30–5:30, third and fourth periods.* Dr. Stare and Staff of the Department.

Credit 2 units.

This course considers in detail the application of current nutritional knowledge to areas of clinical medicine where nutritional deficiency or dietary management are of major importance. The assessment of nutritional status, the diagnosis and management of common deficiency diseases, and the role of nutrition in the etiology and treatment of the chronic and degenerative diseases are discussed.

DEPARTMENT OF PUBLIC HEALTH PRACTICE

ROBERT H. HAMLIN, A.B., B.S.M., B.M., M.D., M.P.H., LL.B., *Roger Irving Lee Professor of Public Health, Director of the Interfaculty Program on Health and Medical Care* and *Head of the Department*

ALFRED L. FRECHETTE, M.D., M.P.H., *Clinical Professor of Public Health Practice* and *Commissioner of Public Health, Commonwealth of Massachusetts*

SOL LEVINE, A.B., A.M., PH.D., *Associate Professor of Social Psychology*

ELIZABETH P. RICE, A.B., S.M., *Associate Professor of Public Health Social Work*

MARJORIE A. C. YOUNG, S.B., ED.M., M.P.H., DR.P.H., *Associate Professor of Health Education*

SYDNEY H. CROOG, A.B., A.M., PH.D., *Assistant Professor of Sociology*

LENIN A. BALER, A.B., A.M., PH.D., S.M. IN HYG., S.D. IN HYG., *Assistant Professor of Psychology*

ROY PENCHANSKY, S.B., M.I.L.R., D.B.A., *Assistant Professor of Administration in Medical Care*

NORMAN A. SCOTCH, A.B., A.M., PH.D., S.M. IN HYG., *Assistant Professor of Social Anthropology*

H. JACK GEIGER, M.D., S.M. IN HYG., *Assistant Professor of Public Health*

WILLIAM L. CLAFF, A.B., M.B.A., *Lecturer on Administration*

WALLACE H. BEST, A.B., A.M., PH.D., *Lecturer on Public Administration*

HARRY T. PHILLIPS, M.B.,CH.B., D.P.H., M.D., *Lecturer on Public Health Practice*

EDWARD B. KOVAR, A.B., A.M., *Lecturer on Public Health Practice*

ARNOLD I. KISCH, A.B., M.D., M.P.H., *Instructor in Public Health*

DAVID L. RABIN, A.B., M.D., M.P.H., *Instructor in Public Health*

JAMES E. TEELE, A.B., A.M., PH.D., *Research Associate in Sociology*

BERYL C. MAGEE, A.B., *Assistant in Public Health Practice*

EDWARD J. ROLDE, A.B., M.D., *Research Fellow in Public Health Practice*

JAMES M. DUNNING, A.B., D.D.S., M.P.H., *Clinical Professor* and *Head, Department of Ecological Dentistry, Harvard School of Dental Medicine* and *Director, Dental Health Service, University Health Services*

WILLIAM J. CURRAN, LL.B., LL.M., S.M. IN HYG., *Lecturer on Legal Medicine, Harvard Law School, (Utley Professor of Legal Medicine, Director, Law-Medicine Research Institute, Boston University)*

GERALD D. ROSENTHAL, A.B., S.M., PH.D., *Assistant Professor of Economics*

SIDNEY S. LEE, S.B., M.D., M.P.H., DR.P.H., *Lecturer on Preventive Medicine, Harvard Medical School,* and *General Director, Beth Israel Hospital*

One of mankind's greatest challenges is to make available to world society

its immense technological knowledge. Unless man has institutions and techniques through which scientific knowledge can be applied to society's benefit, the knowledge itself is limited in its effect. The role of the Department of Public Health Practice is to add to our understanding of and to strengthen these institutions and techniques and to train the policy-makers and administrators who will serve the field of public health throughout the world.

Public health administration is a multidisciplinary art and science. As such, it requires contributions from a wide variety of disciplines, including medicine and other health sciences, business administration, economics, political science, and the behavioral sciences. The training and research programs of the Department of Public Health Practice therefore utilize extensively other resources of Harvard University such as the Schools of Medicine, Public Administration, Business Administration, and Education and the Departments of Economics, Government, and Social Relations.

The courses of the Department are designed to train three broad groups of personnel: generalist administrators in public health, administrators of special health programs, and technical specialists who may have some administrative responsibilities in their careers. The objective is to provide these people with an understanding of organizational and administrative concepts and research methods which are applicable to a wide variety of public health programs.

The research program of the Department is broad and currently deals with studies ranging from quality of medical care to the analysis of administrative processes and controls in health organizations. These studies provide opportunities for both master's degree and doctoral degree candidates to increase their familiarity with research methodology. Fellowship support is available for qualified doctoral candidates.

The Department is involved in a number of service activities with local, state, national, and international organizations which provide opportunities for field experience for students concentrating in the Department. For students entering the School with limited prior public health experience, the Department can arrange field assignments in health agencies during the summer months preceding the commencement of course work. Field assignments for students are also arranged and supervised by the staff of the Department during and following the academic year.

Through its training, research, and service activities the Department seeks to provide a better understanding of sociocultural factors in health and disease and in the administrative process, more insight into methods of influencing the quality and quantity of medical care available to people throughout the world, greater comprehension of the process of economic development and the particular role played by investments in health programs, and an increased understanding of the influence of organizational and administrative structure on health programs.

Public Health Practice 1a,b. Organization and Administration of Health Services I

Lectures and discussion. *Mondays, 10:30–12:30, and Fridays, 10:30–11:30, first period; Mondays and Fridays, 10:30–12:30, second period.* Dr. HAMLIN and associates.

Credit 3 units.

Required of Master of Public Health candidates.

The course presents organizational and administrative concepts essential to planning, implementing, operating, and evaluating government and private health programs.

Among the subjects considered are characteristics and interrelationships of health agencies; manpower requirements for health services; sociocultural factors affecting the organization and administration of health programs; economic, political, and legal aspects of health programs; internal management of health organizations; and comparative administration of health programs in the United States and other countries.

Public Health Practice 2c,d. Organization and Administration of Health Services II

Seminars. *Mondays and Fridays, 1:30–3:30, third and fourth periods.* Dr. HAMLIN, Mr. CLAFF, Dr. CROOG, Professor CURRAN, and associates.

Credit 4 units.

An advanced course for students whose future careers will involve significant administrative responsibilities in health programs.

The course analyzes a number of areas which are important to policy-makers and administrators, including the structure of health organizations, personnel and fiscal management, social factors in organizations, and legal problems of organized health programs. Considerable emphasis is placed upon the decision-making process in organizations as illustrated by comparative studies of similar administrative problems in public health administraton, public administration, and business administration.

The section of the course on legal problems of organized health programs is identical with Public Health Practice 6d and can be taken separately as a one unit course.

Public Health Practice 1a,b is a prerequisite and Interdepartmental Course 1a is recommended.

Public Health Practice 3a,b. Economics and Administration of Medical Care

Seminars. *Tuesdays, 2–4, first and second periods.* Dr. HAMLIN, Professor DUNLOP, Dr. PETERSON, Dr. PENCHANSKY, and Dr. ROSENTHAL.

Credit 2 units.

An interdisciplinary course which surveys major issues in the economics and administration of medical care programs.

The course is designed for graduate students from the Schools of Public Health, Medicine, Business Administration, and Public Administration, and the Department of Economics. Seminars are conducted by the Interfaculty Committee on Health and Medical Care composed of representatives from the participating schools. The course is held at the Littauer Center for Public Administration.

The seminar deals with relationships among resources, organizational structure, methods of payment, and the need and demand for medical care. It explores such major issues as the character of illness and patients, the organization of medical education and medical practice, changing requirements for health manpower and health facilities, patterns of organization of personal health services, quantitative and qualitative standards for medical care, government and private policies on providing and financing personal health services, and factors influencing utilization, efficiency, and cost of various components of medical care, both in the United States and in other countries.

Special reading materials on medical care, selected and prepared by the seminar staff, serve as the basis for seminar discussion and analysis.

Permission of Dr. Hamlin is required for enrollment in this course. The course is also listed as Economics 285.

Public Health Practice 4c,d. Case Study Analysis of Economic and Administrative Problems in Medical Care

Seminars. *Tuesdays, 3:30–5:30, third and fourth periods.* Dr. Hamlin, Dr. Penchansky, Professor Dunlop, Dr. Peterson, Dr. Rosenthal, and Dr. Lee.

Credit 2 units.

An advanced interdisciplinary course which emphasizes analysis, planning, and decision-making in medical care programs through the use of case studies and supplemental materials.

The course is designed for graduate students from the Schools of Public Health, Medicine, Business Administration, and Public Administration, and the Department of Economics. Members of the Interfaculty Committee on Health and Medical Care, composed of representatives from the cooperating schools, participate in the seminars. The course is held at the School of Public Health.

The case studies concern selected government health programs in the United States and other countries, proposals to finance health care for the aged, methods to control cost and utilization of personal health services, organizational and manpower problems in medical care programs, management of union health and welfare programs, and the structure and quality of medical practice.

Public Health Practice 3a,b or permission of Dr. Hamlin is required. Special arrangements permit students to take both this seminar and Biostatistics 2c,d. The course is also listed as Economics 285.

Public Health Practice 5c,d. Health Education

Seminars. *Thursdays, 2:30–4:30, third and fourth periods.* Dr. YOUNG and associates.

Credit 2 units.

This seminar emphasizes major aspects of learning theory, communication theory, educational methods, types of health behavior, health education in the process of social change, psychosocial and cultural factors relevant to the planning of health education programs, and research and evaluation in health education. Major focus in the seminar is on health education aspects of health programs, including school health services.

Public Health Practice 6d. Legal Problems of Organized Health Programs

Eight seminars to be included as a special section of Public Health Practice 2c,d. This section may be elected separately. *Mondays and Fridays, 1:30–3:30, for part of the fourth period.* Professor CURRAN.

Credit 1 unit.

This course is designed for students who are particularly interested in legal aspects of health programs.

Seminars include discussions of constitutional problems in public health programs, the legislative process, professional and legal standards for the health professions and in research, general considerations of administrative law, regulation-making by health organizations, legal reforms in personal injury litigation, and the presentation of expert medical testimony.

Public Health Practice 7b. The Development of Personality in Health and Disease

Seminars. *Fridays, 3:30–5:30, second period.* Dr. BALER.

Credit 1 unit.

This course discusses concepts and data of particular relevance to public health workers for increasing their understanding of factors influencing healthy and unhealthy personality development. Its primary purpose is to clarify the need for community mental health programs and to suggest areas for research.

Seminars include discussion of genetic, prenatal, and postnatal factors, the role of parent-child relationships, and the sociocultural influences of the community on personality development. Special topics, such as juvenile delinquency and mental retardation, are presented as student reports.

Public Health Practice 8c,d. Health and Illness in Cross-Cultural Perspective

Seminars. *Mondays, 3:30–5:30, third and fourth periods.* Dr. Levine, Dr. Scotch and associates.

Credit 2 units.

This course, also listed as Social Relations 283, is designed for public health students who seek greater familiarity with social and cultural aspects of medicine in this and other countries, and for social science students interested in health and health services as a research area. Much of the course consists of presentations by experts conducting specific studies of a sociomedical nature, followed by informal class discussion. Admission is limited and requires consent of the instructor.

Public Health Practice 15a,b,c,d. Departmental Seminar

Seminars. *Wednesdays, 1:30–3:30, in all four periods.* Staff of the Department.

Credit 4 units.

The course is for students with a major interest in the organization and administration of health programs. It is concerned with administrative theory, the decision-making process in program development, and research in problems of administration.

The course begins with discussions in depth of a limited number of specific health programs in which practicing program administrators and members of the Department staff participate. Administrative research and the role of research in program planning and evaluation are then discussed using actual research projects as case examples. Finally, each student presents for class evaluation a paper which he has prepared during the year on either a specific program plan or research project.

Public Health Practice 17a,b,c,d,e. Tutorial Program

Time and credit to be arranged.

Master's degree candidates may make arrangements to do individual and group work under the guidance of a staff member of the Department.

This work can include readings and special projects in such areas as dental health and medical care. In addition, field assignments to federal, state and local government and private health organizations can be arranged during the field work period from February 1 to February 6, 1965.

Public Health Practice 20. Research

Doctoral candidates are offered the opportunity to undertake individual study and research as the basis for a doctoral thesis.

DEPARTMENT OF TROPICAL PUBLIC HEALTH

THOMAS H. WELLER, A.B., S.M., M.D., LL.D., *Richard Pearson Strong Professor of Tropical Public Health* and *Head of the Department*

FRANKLIN A. NEVA, S.B., M.D., *Professor of Tropical Public Health*

ELI CHERNIN, S.B., A.M., S.D., *Associate Professor of Tropical Public Health*

CHARLOTTE C. CAMPBELL, S.B., *Associate Professor of Medical Mycology*

THOMAS E. FROTHINGHAM, M.D., *Assistant Professor of Tropical Public Health*

STEVE C. PAN, B.SC., M.D., M.P.H., *Assistant Professor of Tropical Public Health*

EDWARD H. MICHELSON, S.B., S.M., PH.D., *Assistant Professor of Tropical Public Health*

ANDREW SPIELMAN, S.B., S.D., *Associate in Tropical Public Health*

PAUL F. RUSSELL, A.B., M.D., M.P.H., S.D. (hon.), *Visiting Lecturer on Tropical Public Health*

FRED L. SOPER, A.B., S.M., M.D., DR.P.H., S.D. (hon.), *Visiting Lecturer on Tropical Public Health*

GEORGE M. SAUNDERS, A.B., M.D., *Visiting Lecturer on Tropical Public Health*

SAMUEL W. SIMMONS, S.B., A.M., PH.D., *Visiting Lecturer on Tropical Public Health*

G. ROBERT COATNEY, A.B., A.M., PH.D., S.D. (hon.), *Visiting Lecturer on Tropical Public Health*

HARRY MOST, S.B., M.D., D.T.M.&H., D.M.S., *Visiting Lecturer on Tropical Public Health*

RICHARD H. DAGGY, S.B., S.M., PH.D., M.P.H., DR.P.H., *Visiting Lecturer on Tropical Public Health*

CHARLES A. ALFORD, JR., S.B., M.D., *Research Fellow in Tropical Public Health*

JOSEPH W. BURNETT, A.B., M.D., *Research Fellow in Tropical Public Health*

PETER BRAUN, S.B., M.D., *Research Fellow in Tropical Public Health*

ROBERT J. M. WILSON, B.SC., *Research Fellow in Tropical Public Health*

GUSTAVE J. DAMMIN, A.B., M.D., A.M. (hon.), *Elsie T. Friedman Professor of Pathology*

FRANZ C. VON LICHTENBERG, M.D., DR. (hon.), *Assistant Professor of Pathology at the Peter Bent Brigham Hospital*

The health problems of the tropical regions are, for the most part, those of the poorly sanitated areas of the world at large. In such areas the communicable and nutritional diseases are of primary import. The teaching and

research interests of the Department of Tropical Public Health deal with the former category — the communicable diseases. Emphasis is given to disease entities that occur in the more developed areas of the world, and to a much smaller group of diseases that are tropical in an obligatory sense for climatic or other reasons. In the presentation of factual material, equal emphasis is given to ecological and epidemiological factors, to new knowledge concerning pathogenesis and diagnosis, and to prevention and control.

The basic course, Microbiology-Tropical Public Health 1a,b,c is designed to provide the Master of Public Health candidate with an integrated presentation of information on communicable diseases of major public health importance. Tropical Public Health 2a,b is designed for the Master of Public Health candidate concentrating in the field of Tropical Public Health. Attention is directed to Tropical Public Health 3d, open to all students, which deals with environmental and cultural factors influencing the development of health programs in tropical areas. With the exception of Tropical Public Health 3d, admission to the basic courses is contingent upon an adequate background in the pre-clinical medical sciences, especially pathology.

The investigative program in the Department is broad and currently deals with pathogens ranging from viruses to helminths. Thus, studies on the *in vitro* cultivation and the physiology and immunology of a wide variety of agents are in progress. Biological investigations on the molluscan vectors of the schistosomes comprise another area of major interest. Facilities are available for the training of a limited number of students at the Doctor of Public Health or Doctor of Science in Hygiene level, who may wish to spend a minimum of two years with emphasis on a program of original research. Due to time limitations, the Doctor of Science in Hygiene applicant should, in so far as possible, obtain the necessary medical science background prior to enrollment.

A program supported by the National Institutes of Health is available to assist qualified applicants who desire training in medical parasitology, (see page 102) and a similar program is available to provide training in tropical medicine. Collaborative arrangements established with institutions in the tropics provide diversified opportunities for study and research overseas.

Microbiology and Tropical Public Health 1a,b,c. Ecology and Epidemiology of Infectious Diseases

Lectures, seminars, conferences and laboratory exercises. *Tuesdays, 10:30–11:30, Wednesdays, 9:30–10:30, Thursdays, 11:30–12:30 and 1:30–4:30, first period; Tuesdays and Thursdays, 10:30–11:30, Wednesdays, 9:30–10:30, Thursdays, 1:30–4:30, second period; Mondays, Wednesdays and Fridays, 9:30–10:30, Tuesdays and Thursdays, 10:30–11:30, third period.* Dr. WELLER, Dr. LEY and Staff of the two Departments.

Credit 6 units.

One of the six semi-elective courses from which Master of Public Health candidates are required to elect a minimum of 12.5 credit units.

This course is under the general direction of Drs. Weller and Ley, with the collaboration of the staff of the Departments of Microbiology, Tropical Public Health and Epidemiology. The purpose of the course is to provide students in the Master of Public Health program with the basic knowledge of the communicable and infectious diseases, including the relevant ecologic factors which pertain directly to their prevention and control.

Microbiology and Tropical Public Health 1a,b,c is designed for students who have had most of the courses given in the first two years of medical school or their equivalent. The exercises include discussions of the present status of infectious diseases in tropical and temperate climates and the technics available for study of microorganisms and parasites, with special reference to recent methods which have opened a new era in microbiology. The course emphasizes the principal diseases of public health importance. The subjects are presented by etiologic agent, including protozoa, helminths, viruses, rickettsiae, spirochetes and bacteria.

Approximately two-thirds of the time will be devoted to lectures and one-third to conferences, seminar discussions, and laboratory exercises. In the laboratory the student is expected to acquire an understanding of the potentialities as well as the limitations of pertinent public health laboratory procedures.

Tropical Public Health 2a,b. Ecology and Prevention of Tropical Diseases

Seminars, laboratory exercises, assigned reading. *Wednesdays, 1:30–3:30, first and second periods.* Dr. Neva, Dr. Chernin and Dr. Frothingham.

Credit 2 units.

This course is designed for students concentrating in the Department of Tropical Public Health. It is planned to supplement Microbiology-Tropical Public Health 1a,b,c, and deals with important disease entities omitted from the basic course because of time limitations. Emphasis is placed on the ecological and epidemiological approach to the multiplicity of interrelated factors governing the welfare of man in tropical and poorly sanitated areas.

Tropical Public Health 3d. Problems in Tropical Health

Lectures and conferences. *Fridays, 10:30–12:30, fourth period.* Dr. Weller and guest lecturers.

Credit 1 unit.

This course is designed to provide general background information on environmental, social, economic, and political factors influencing the development of health programs in the tropics. At each session a distinguished guest lecturer covers an assigned topic; the subject material includes such diversi-

fied topics as the status of professional education in tropical areas, the importance of the zoonoses, and political policies in the field of international cooperation. Each formal presentation is followed by a period devoted to informal student discussion. Registration is open to all students.

Tropical Public Health 5c,d. Seminar

Seminars and discussions. One hour session twice a month throughout the third and fourth periods. Time to be arranged. Staff of the Department.

Credit .5 unit.

Students particularly interested in tropical health will meet with staff members for the presentation and discussion of current literature and original investigations. Admission for credit is subject to the approval of the Head of the Department, and the total number of students is limited.

Tropical Public Health 6c. Parasitic Infections of Man

Lectures, laboratory exercises and demonstrations. *Twelve afternoons, Mondays, Wednesdays, and Fridays, 2–5, January and February.* Dr. WELLER, Dr. NEVA, Dr. CHERNIN, Dr. FROTHINGHAM, Dr. MICHELSON, Dr. PAN and associates.

Credit 1.5 units.

This course is designed primarily for students in the School of Medicine. It is open, however, to a limited number of students registered in the School of Public Health. The important helminth and protozoan parasites of man are considered with reference to their geographic distribution, identification, mode of transmission, pathogenesis, immune reactions, and methods for prevention and control. Clinical aspects and chemotherapy of parasitic diseases are discussed. Emphasis is given to methods of laboratory diagnosis. Arthropods of parasitologic importance are briefly surveyed.

Tropical Public Health 7c. Laboratory Technics

Conferences and laboratory. *Tuesdays and Thursdays, 2:30–5:30, third period.* Dr. PAN.

Credit 2 units.

Students are offered the opportunity to learn principles and technics essential for the study of animal parasites of medical and public health importance. The course consists of lectures and laboratory work under tutorial supervision. Emphasis is placed on *in vitro* and *in vivo* cultivation of parasites, their identification, and the investigation of their biological properties. The course is designed to prepare those who will be involved in laboratory research or in field studies in the area of medical parasitology.

Enrollment limited and subject to the approval of the instructor.

Tropical Public Health 8d. Introduction to Molluscs of Public Health Importance

Conferences, laboratory and field exercises. *Tuesdays, 2:30–5:30, fourth period.* Dr. MICHELSON.

Credit 1 unit.

This is an introductory course designed to acquaint the student with the molluscs which may act either as active or passive agents for the dispersal of pathogens, toxins, or parasites which cause disease in man. Students will be offered the opportunity to study field and laboratory technics necessary for an understanding of the taxonomy, morphology, cultivation, ecology and control of these molluscs.

Prerequisite: Consent of instructor.

Tropical Public Health 9d. Introduction to Medical Entomology

Conferences, laboratory, and field exercises. *Thursdays, 2:30–5:30, fourth period.* Dr. SPIELMAN.

Credit 1 unit.

This course deals with the insects, ticks and mites of medical importance. Their recognition, biology, and role in the production of disease are considered. Techniques of identification, collection, rearing and handling will be demonstrated and insect anatomy and physiology briefly reviewed.

Prerequisite: Consent of instructor.

Tropical Public Health 17a,b,c,d,e. Introduction to Laboratory Research

Laboratory exercises. Time and credit to be arranged.

Individual work for candidates at the Master's degree level may be carried out under supervision of a member of the Department. A variety of parasites of medical importance are maintained and are available for studies on metabolism, host-parasite relationships, and chemotherapy. Arrangements are subject to the approval of the instructor.

Tropical Public Health 20. Research

Doctoral candidates or qualified full-time special students may undertake original investigations in the laboratory or in the field by arrangement with the Head of the Department.

Tropical Public Health 44b. Clinical and Pathologic Features of Tropical Diseases

Case presentations, clinico-pathologic conferences, and demonstrations. *Tuesdays, 1:30–3:30, second period.* Dr. NEVA, Dr. VON LICHTENBERG and staff members.

Credit 1 unit.

This course, designed for students particularly interested in tropical medicine, supplements material presented in Microbiology-Tropical Public Health 1a,b,c. The emphasis is on the clinico-pathologic aspects of tropical diseases. At each session one or more disease entities are introduced by presentation of a clinical case, and pertinent clinical and pathological features of the disease then reviewed. Enrollment subject to approval of the instructor.

Prerequisite: Tropical Public Health 6c or equivalent, or enrollment in Microbiology-Tropical Public Health 1a,b,c.

Section IV
Special Programs

An analysis of the positions occupied by the alumni of the Harvard School of Public Health has shown that they are engaged in a wide range of activities in public health, engineering and medicine. It is of particular importance to the School, however, that approximately 20 per cent of its graduates have entered careers in education and research. Thus the curriculum must provide students with the basis for effective participation in the academic as well as the administrative aspects of public health. A course of study leading to a doctoral degree is the traditional way to prepare for an academic career. The alternative, for those who have completed their professional education, is to spend enough time as a research fellow to learn the technics of investigation and to acquire thorough knowledge of a particular field. The Harvard School of Public Health encourages both types of activity, and offers many courses designed for advanced students and research fellows.

In pursuing these objectives the Faculty has, from time to time, undertaken new plans of instruction when it is clear that the School has both the opportunity and the ability to meet a need in one of the major areas of public health. The experience gained determines whether the particular undertaking can be incorporated into the general academic activity of the School. An example is the special program for teachers of preventive medicine and public health which was begun in 1956 and which has been integrated with the regular academic activities of the School, as described below.

Preventive Medicine and Public Health. In recognition of the need for well trained teachers of preventive medicine and of public health, the School welcomes students whose field of endeavor is, or is likely to be, in departments of preventive medicine and public health in this country or abroad. Each candidate for an academic career in preventive medicine and public health is encouraged to select either a research fellowship or that particular degree program of the School which is best suited to his individual needs and his own professional

background. The regular academic programs of the School are sufficiently flexible to meet the varied needs of individual students seeking preparation for academic careers.

Regardless of their degree status, these students are encouraged to acquire a high level of competence in one of the public health disciplines, this being essential for success in an academic career. Special seminars and short periods of observation at representative institutions are included in the schedules offered by the School. When it is advantageous to a particular student, the School seeks to coordinate his course of study with residency training programs, such as those which may be recommended by the American Board of Preventive Medicine or which may be developed in other countries.

Programs Related to Mental Health and Mental Disorder

Problems of mental health and mental disorder are of concern to several departments of the School, particularly Epidemiology, Maternal and Child Health, and Public Health Practice. By developing opportunities for study and research in several aspects of the broad field of mental health, the School hopes to encourage the enrollment of students or the application of research fellows who are interested in mental health and who are qualified to undertake advanced studies in preparation for careers in teaching, research, and administration. For those who enroll as students, the programs in mental health are arranged within the framework of the various degrees offered by the School (see pages 27–35).

In the Department of Epidemiology, students and research fellows may undertake a program of study and research in the application of epidemiologic methods to mental disorders. The plan of work is arranged on an individual basis in consultation with the head of the Department.

In the Department of Maternal and Child Health, students may participate in the community studies concerned with the significance of mental disorders in pregnancy and childhood.

The program of advanced instruction for community mental

health specialists in the Department of Public Health Practice was transferred on July 1, 1964 to the Laboratory of Community Psychiatry of the Department of Psychiatry, Harvard Medical School. Psychiatrists and behavioral scientists who seek a specialist career in teaching or research or in the administration of organized community programs for the prevention and control of mental disorders may obtain information about the Medical School program by writing Dr. Gerald Caplan, Clinical Professor of Psychiatry and Director, Laboratory of Community Psychiatry, 58 Fenwood Road, Boston, Massachusetts.

Programs of Study in the Division of Environmental Health Sciences and Engineering

The combination of medical, engineering, and related disciplines in the Division of Environmental Health Sciences and Engineering enables the School to offer programs of instruction in special fields such as occupational medicine, aviation health and safety, radiological health, toxicology, and community air pollution control. The Division includes the Departments of Industrial Hygiene, Sanitary Engineering and Physiology. The University Health Services' Division of Environmental Health and Safety is closely related and provides opportunities for practical experience in environmental health activities within the University.

Occupational Medicine

Physicians may enroll in this program through any one of the Masters degrees offered by the School. Qualified students may be accepted for a second year of work toward a doctoral degree in one of the fields of occupational medicine or environmental health. Other students may elect to remain for a second year of formal courses and tutorial study in occupational medicine and public health.

The usual course content of the program is listed under the Master of Industrial Health degree (page 30). Additional courses and course content may be found under the department listings.

Aviation Health and Safety

Students may undertake an academic program in Aviation Health and Safety as candidates for one of the various degrees offered by the School (see pages 27–35).

Weekly seminars given throughout the year are designed to meet the special interests of those concentrating in the field of aviation medicine, not only for representatives of the military services, but also for those who plan to enter the medical or engineering departments of aircraft manufacturing companies and civil airlines.

Industrial Hygiene and Industrial Hygiene Engineering

Graduate students in engineering, chemistry, physics, and biology may be admitted to a two-year program leading to a Master of Science in Hygiene degree in industrial hygiene and industrial hygiene engineering. Students having an acceptable year of graduate work elsewhere may be admitted to the program on a one-year basis.

Radiological or Health Physics and Radiation Control Programs

Programs in radiological hygiene and radiation control are offered by the School of Public Health to graduate students only. Properly qualified students may be admitted to a one- or two-year program depending upon whether they have had an acceptable year of graduate work elsewhere. This program leads to a Master of Science in Hygiene degree. A program of courses in radiological hygiene, atomic and nuclear physics, radiological engineering, industrial hygiene, physiology, toxicology, radiation biology and related subjects is planned on the basis of individual backgrounds and needs.

Program in the Economics and Administration of Medical Care

This interdisciplinary Program, offered by the Department of Public Health Practice, is part of the Interfaculty Program on Health and Medical Care of the Harvard University Department of Economics and Schools of Public Health, Medicine, Business Administration, and Public Administration. The Program offers train-

ing and research experience in the provision of medical care services and stresses the study and analysis of varying patterns of personal health services in the United States and other countries.

Students in the Interfaculty Program include physicians and other health professionals, economists, social scientists, and management analysts. They are from various schools and departments within Harvard University, and are enrolled as master and doctoral degree candidates in their own schools and departments while taking the Program's basic courses. The objective with students enrolled in the School of Public Health is to train them in analysis and decision-making and to give them an appreciation of the application of the administrative and social sciences in the operation of medical care programs. For students from other than the School of Public Health, the Program's objective is to provide an adequate understanding of medical care services to allow for the intelligent application of their own specialities to the medical care scene.

The Program's research studies provide opportunities for exceptional students to undertake doctoral work and to gain substantial research experience.

Section V
General Information

GENERAL INFORMATION

Registration

Registration in the School of Public Health for the academic year 1964–65 takes place from Monday, September 21 to Friday, September 25. In order to allow ample time for planning of individual course programs and for discussions with Faculty members, students enrolling for the first time are expected to start the registration procedures on Monday of registration week.

Foreign Students

An orientation course for students coming to the United States for the first time will be held at the School of Public Health from Monday, September 14 to Friday, September 25, 1964. The program is planned to acquaint the students with our customs and teaching methods, with library and other facilities available. It will include lectures and seminars, visits to various University departments and to hospitals or public health activities in Boston.

During this period each student who comes from outside the United States will have a conference with the Faculty Advisor for Foreign Students to discuss his particular needs and interests. This Advisor, as well as the staff of the Dean's Office, is available for consultation with students throughout the year.

All students who are not citizens of the United States will be referred during the orientation period to the Harvard International Office, Holyoke Center, 75 Mt. Auburn Street, Cambridge, where they will show their passports, and fill out a Student Registration form.

Fees and Expenses

The tuition fee is $1,520 for all first-year full-time students and for candidates for the degree of Master of Science in Hygiene who

are in the second year of a two-year program. The fee includes the Health Service Fee for medical care and insurance for all resident students. Each candidate for a degree must have a minimum of one year of residence at the School at full tuition. Students who are enrolled for less than full time pay tuition at reduced rates, as shown in the following schedule:

First Year	
Half-time students	$820 per year
Second Year	
Full-time resident doctoral candidates	$820 per year
Half-time resident doctoral candidates	470 per year
Non-resident doctoral candidates	250 per year
Other half-time resident students	820 per year
After the second year	
Resident doctoral candidates	$320 per year
Part-time Special students, enrolled for less than half-time	
First credit unit of course work per term	$80
Each additional unit per term up to 10 units	$35

Payment of Fees

Bills for tuition and fees will be issued and payable as follows:

Issued	*Payable*	
At registration	Within 10 days	¼ Tuition
Nov. 30	Dec. 15	¼ Tuition Board through October 31 Miscellaneous Charges
Jan. 30	Feb. 15	¼ Tuition Board through December 31 Miscellaneous Charges

April 30	May 15	¼ Tuition Board through March 31 Miscellaneous Charges
June 9 *	June 16	Board to the end of the year Miscellaneous Charges
June 30	July 15	Board to the end of the year Miscellaneous Charges

Students who are candidates for degrees must have paid all dues to the University at least one day before the day upon which the degrees are to be voted. A student who leaves during the year is charged to the end of the tuition period in which he leaves provided before that time he gives the Dean notice in writing of his withdrawal; otherwise he is charged to the end of the tuition period in which such notice is given.

A student who leaves the University for any reason whatever must pay all charges against him immediately upon receipt of a bill from the Comptroller's Office. Every student will be held responsible for the payment of fees until he has notified the Dean of his intention to withdraw from the School.

All term bills will be sent to the student at his local address unless the Comptroller's Office is requested in writing to send them elsewhere.

Any student whose indebtedness to the University remains unpaid on the date fixed for payment is deprived of the privileges of the University. Reinstatement is obtained only by consent of the Dean of the School in which the student is enrolled after payment of all indebtedness and a reinstatement fee of $10. In addition as a condition of reinstatement such student is required to file with the Comptroller a bond in the amount of $1000 as security for the payment of future term bills.

Student Health Service

Under the University Health and Insurance Plan students at the School receive medical care and insurance toward hospital expenses.

* Applies only to candidates for degrees.

Medical care is provided through the facilities of the Medical Area Health Service, located in the Peter Bent Brigham Hospital. The hospital insurance extends for a period of twelve months from September 1 and covers hospitalization both in Boston and elsewhere. Research Fellows in training status may enroll in the Student Plan.

Dependents of students may be included in the hospital insurance part of the plan, if the student so elects; the rates are $40 for wives or husbands and $34 for one or more children, for twelve months. Students are advised to avail themselves of this option.

Every new student is required to undergo a medical examination, by appointment, shortly after admission to the School.

Evidence of successful vaccination against smallpox within three years is required for entrance to Harvard University and a certification form for this purpose is sent to each student who is accepted for admission.

Any illness necessitating absence from classes should be reported to the Student Health Service Office by the student, or an attending physician, and to the Registrar's Office at the School.

In order to realize maximum benefit from the opportunities provided by the academic program of the School, students must be in excellent physical and mental health. Prospective students are urged to undergo a thorough examination to satisfy themselves of their fitness before making arrangements to enter the School.

Housing

The Henry Lee Shattuck International House of the School of Public Health was opened in the fall of 1960 as a residence for its graduate students and their families. The Shattuck International House includes three remodelled apartment houses, at 199, 203 and 207 Park Drive, Boston, within walking distance of the School. There are 63 apartments on four floors, including units with one to four rooms, plus kitchenette, bath and foyer. Essential furniture and kitchen equipment are provided. On the ground floors of the buildings are located the social and recreational common rooms for the

adult residents, the laundry facilities and a playroom for the children. There is also an equipped outdoor playground for the children of the Shattuck International House. Because of the demand for the limited number of large apartments, students wishing to bring their families are advised to make early application. All inquiries should be addressed to Mrs. Margaret D. Penrose, Harvard School of Public Health, 55 Shattuck Street, Boston, Mass. 02115.

Other accommodations are available in the vicinity of the School or in nearby residential areas. Information may be obtained from the Harvard University Housing Office, 1737 Cambridge Street, Cambridge, Mass. 02138, or from the Registrar of the Harvard School of Public Health at 55 Shattuck Street. Married students should indicate the size of their family, number of rooms desired and whether they wish furnished or unfurnished quarters.

Employment

Generally it is not advisable for a student to seek employment as a means of financing his training because the course of study at the School is an intensive, full-time program. If the wife of a student has secretarial or technical skills and wishes to obtain temporary employment, she may consult the Harvard Medical Center Personnel Office in Building A of the Medical School after getting settled in Boston. Wives of foreign students who wish to work in Boston must indicate this when obtaining their visas for the United States.

Fellowships and Traineeships

The fellowships and traineeships described below were available to students for the academic year 1963–64. It is expected that comparable awards will be available for 1965–66.

Applications for fellowships and traineeships should be made to: The Registrar, Harvard School of Public Health, 55 Shattuck Street, Boston, Massachusetts. Applications should be received by April 1, 1965 for awards for the academic year 1965–66. Under exceptional circumstances awards may be considered at other times.

Fellowships and Traineeships Awarded by the School

Fellowships and traineeships are available from grants to the School for students who are candidates for master's or doctor's degrees. They include a monthly stipend plus tuition. Applicants for awards from Public Health Service or Children's Bureau grants must be citizens of the United States or have filed a Declaration of Intent.

1. Public Health Service General Purpose Traineeship Grant (Title I) for physicians, dentists, veterinarians, nutritionists, medical social workers, health educators and others whose professional skills are required in modern public health practice.

2. Public Health Service Title II traineeships for public health nurses.

3. Traineeships from Public Health Service Training Grants to Departments of the School are available for study at the pre-doctoral or post-doctoral levels in the following fields:

Biostatistics.

Environmental Health (including occupational medicine, radiological health and air pollution).

Industrial Hygiene.

Physiology (including toxicology).

Epidemiology; for candidates with degree of M.D. or Ph.D. or equivalent.

Microbiology; for candidates with degree of M.D. or Ph.D. who wish to specialize in the field of infectious disease, including rickettsial, viral, bacterial and mycological infections.

Nutrition.

Public Health Service Special Purpose Traineeship Grant for research training in medical care administration and in public health practice. Available for qualified candidates in the health professions and the social sciences at the post-master's or post-doctoral levels.

Tropical Public Health; for training in medical parasitology, in tropical medicine and in tropical public health.

4. Fellowships provided by a grant from the Children's Bureau

are available for students who intend to specialize in Maternal and Child Health.

5. Fellowships provided by a training grant from the National Aeronautics and Space Administration are available for students who intend to specialize in aerospace health and safety.

Fellowships Awarded Outside the School

Fellowships are available in Industrial Medicine and Health Physics from the Atomic Energy Commission. Applicants for fellowships in Industrial Medicine (physicians only) should write to: A.E.C. Fellowships in Industrial Medicine, Atomic Energy Project, University of Rochester, School of Medicine and Dentistry, Rochester 20, New York. Applicants for fellowships in Health Physics should write to: Fellowship Office, Oak Ridge Institute of Nuclear Studies, Oak Ridge, Tennessee.

Fellowships and Scholarships Available in other Departments of the University as well as in the School of Public Health

There are a few General University Scholarships and Fellowships which, under the terms of the original gift to the University, may be awarded to students in any part of the University, including the School of Public Health. Many of these are for persons from a particular city, state or country, for study of a particular field, or for those with other special qualifications. Applications for these scholarships must be received at the School of Public Health by February 1, 1965. A pamphlet describing these University Scholarships may be obtained from the Secretary of Admissions and Scholarships of the School of Public Health.

STUDENTS, 1963–64

Degree Candidates and Full-Time Special Students

Scott I. Allen, A.B., M.D., M.P.H.	Washington, D.C.
Kevin M. Allman, M.B.,B.CH.	Dublin, Ireland
Harry J. Ashe, A.B., M.D.	Wolfeboro, New Hampshire
E. Kenneth Aycock, A.B., M.D.	Columbia, South Carolina
Lowell E. Bellin, S.B., M.D.	Longmeadow, Massachusetts
Joseph D. Brain, A.B., S.M., S.M. IN HYG.	Wayne, New Jersey
George F. Brown, M.D.	Toronto, Ontario, Canada
Max J. Bulian, S.B., M.D.	Chestnut Hill, Massachusetts
C. Ralph Buncher, S.B.	Millburn, New Jersey
Edward J. Burger, Jr., B.SC., M.D.,C.M., M.I.H.	Lorain, Ohio
Thomas R. Byrd, S.B., M.D.	Kershaw, South Carolina
Ely Bulba, B.SC.	Cambridge, Massachusetts
Kirby I Campbell, S.B., D.V.M.	Riverside, California
Robert E. Carroll, A.B., M.D.	Delmar, New York
Joseph A. Cimino, A.B., S.M., M.D.	Valhalla, New York
Roger R. Connelly, S.B.	Mason City, Iowa
Julius S. Conner, A.B., M.D.	Des Moines, Iowa
Catherine Coolidge, A.B., M.D.	Boston, Massachusetts
Kenneth E. Cottle, M.D.	Brady, Texas
James D. Cowie, S.B., S.M.	Andover, Massachusetts
Allen L. Cudworth, S.B., S.M.	Framingham, Massachusetts
Kenneth W. Curtis, S.B., M.D.	Chicago, Illinois
Raphael J. DiNapoli, Jr., A.B., M.D.	Brooklyn, New York
Stanley L. Dryden, S.B.	Glendale, California
Richard E. Easton, A.B., M.D.	La Mirada, California
Manning Feinleib, A.B., M.D., M.P.H.	Brooklyn, New York
Gary D. Friedman, S.B., M.D.	Cambridge, Massachusetts
Theodore Georgiadis, B.SC.	Athens, Greece
Robert L. Glass, S.B., D.M.D., M.P.H.	Westwood, Massachusetts
Bernard G. Gray, A.B., PH.D.	Brookline, Massachusetts
R. Frances Grommers, A.B., M.D.	Boston, Massachusetts
Virginia R. Hannon, A.B., A.M., M.S.S.W., S.M. IN HYG.	Atlanta, Georgia
Norris Hansell, A.B., M.D.	Havertown, Pennsylvania
Jamal K. Harfouche, A.B., M.D., S.M. IN HYG.	Beirut, Lebanon
Norman B. Hasler, A.M., M.D.	Arlington, Massachusetts
Kathleen Hawkins, A.B., M.D.,C.M.	Montreal, Quebec, Canada

Marion E. Highriter, A.B., M.N., M.P.H.	Wilkes-Barre, Pennsylvania
Warren W. Hodge, S.B., M.D.	Waynesville, North Carolina
Alfonso H. Holguin, A.B., M.D.	Atlanta, Georgia
Alice M. Hosack, S.B., A.M., S.M. IN HYG.	Masury, Ohio
William R. Jobin, S.B., S.M.	Foxboro, Massachusetts
A. Kay Keiser, S.B., M.P.H.	Kulpmont, Pennsylvania
Walter W. Kemmerer, Jr., S.B., M.D.	Houston, Texas
Irving I. Kessler, A.B., A.M., M.D., M.P.H.	Boston, Massachusetts
William H. King, A.B., M.D.	Irving, Texas
Arnold I. Kisch, A.B., M.D.	Boston, Massachusetts
Leslie M. Klevay, S.B., M.D., S.M. IN HYG.	Skokie, Illinois
Emma Kraidman, A.B., S.B., A.M., PH.D.	Chestnut Hill, Massachusetts
Lorraine D. Kugell, A.B.	Winthrop, Massachusetts
Leo Levy, S.B., A.M., PH.D.	Pueblo, Colorado
Yuling Li, A.B.	Brookline, Massachusetts
Donald N. Logsdon, S.B., M.D.	West Palm Beach, Florida
Adetokunbo O. Lucas, B.SC., M.B.,B.S.	Ibadan, Nigeria
Julio I. Maiztegui, S.B., M.D.	Buenos Aires, Argentina
A. Helen Martikainen, A.B., M.P.H., S.D. (hon.)	Laconia, New Hampshire
James O. Mason, A.B., M.D., M.P.H.	Auburndale, Massachusetts
Malay K. Mazumder, B.SC., M.SC.	Bombay, India
Walter F. Mazzone, A.B., S.B.	Groton, Connecticut
Mary Ann McNichol, A.B., A.M.	Danvers, Massachusetts
Maureen K. Molloy, A.B., M.D.	Boston, Massachusetts
David M. Nitzberg, A.B., S.M., S.M. IN HYG.	Lexington, Massachusetts
Nadipuram R. Parthasarathy, B.SC., B.SC., M.SC.	Mysore, India
John M. Peters, S.B., M.D.	Brigham, Utah
Stephen J. Plank, PH.B., A.B., M.D., M.P.H.	Carmel, California
Earl S. Pollack, S.B., A.M.	Silver Spring, Maryland
Hernando Posada, A.B., M.D.	East Williston, New York
Edward O. Pratt, L.R.C.P.&S.	Freetown, Sierra Leone
David L. Rabin, A.B., M.D.	Lancaster, Pennsylvania
Abdur Rashid, B.SC., M.SC., M.SC.	Chittagong, East Pakistan
Erik G. Rasmussen, D.D.S.	Copenhagen, Denmark
Helen Z. Reinherz, A.B., S.M., S.M. IN HYG.	Malden, Massachusetts
Parker C. Reist, S.B., S.M., S.M. IN HYG.	State College, Pennsylvania
Leo H. Riley, Jr., A.B., M.D.	Newtonville, Massachusetts
William S. Runyan, S.B., S.M.	Moscow, Idaho
Richard J. Salina, S.B., M.D.	Pittsburgh, Pennsylvania
Larry D. Samuels, A.B., S.B., M.D., S.M. IN HYG.	New Windsor, Illinois
Hilbert B. Savage, Jr., M.D.	Memphis, Tennessee

Anne W. Schaefer, A.B.	Westport, Connecticut
Vern L. Schramm, S.B.	Coolidge, Arizona
Irwin Schultz, A.B., M.D., S.M. IN HYG. (in absentia)	Morton Grove, Illinois
Robert K. Sikes, A.B., D.V.M.	Atlanta, Georgia
Alvin J. Simmons, S.B., S.M., PH.D., S.M. IN HYG.	South Dartmouth, Massachusetts
Henry E. Simmons, S.B., M.D.	Lexington, Massachusetts
Robert G. Smith, S.B., M.D., LL.B.	Broken Arrow, Oklahoma
Barry A. Smithurst, M.B.,B.S., M.R.A.C.P.	Melbourne, Australia
Hope H. Snider, A.B., M.D.	Cambridge, Massachusetts
Arvid Steen, M.D.	Oslo, Norway
Hideo Suzuki, B.AGR.	Tokyo, Japan
Valeria M. Szigeti, S.B.	Staten Island, New York
Ram P. Tewari, B.SC., B.V.SC.&A.H., M.V.SC.	Faizabad, India
Captane P. Thomson, A.B., M.D.	Oakland, California
Dwight W. Underhill, B.E., S.M. IN HYG.	Washington, D.C.
Michael O. Varner, S.B.	San Luis Obispo, California
Robert W. Veit, S.B.	Visalia, California
Anton F. Vierling, S.B., S.M.	Westport, Connecticut
Elizabeth L. Watkins, A.B., M.S.S.A, S.M. IN HYG.	Chevy Chase, Maryland
David E. Weeks, S.B., M.D.	Dhahran, Saudi Arabia
Deborah H. Weiss, A.B.	Oak Park, Illinois
Dorothy J. Worth, M.D.	Newton, Massachusetts
John D. Yoder, S.B., S.M. IN HYG.	Kenilworth, New Jersey
Omar A. M. Zawawi, M.B.,B.CH.	Dammam, Saudi Arabia
Alan Ziskind, A.B., M.D.	Belmont, Massachusetts

Part-Time Special Students

Diana B. Fischer, A.B.	Cambridge, Massachusetts
Philip LaTorre, S.B., S.M.	Wakefield, Massachusetts
E. Joseph LeBauer, M.D.	Greensboro, North Carolina
Lloyd A. LeZotte, Jr., A.B., A.M., PH.D., M.D.	Framingham, Massachusetts
Keith MacGaffey, A.B., M.D.	Brookline, Massachusetts
Zdravko R. Valahcevic, M.D.	Boston, Massachusetts
Lena E. C. Wettermark, FIL. KAND.	Natick, Massachusetts

DEGREES

On June 13, 1963, the following degrees were conferred:

Doctor of Science in Hygiene

Beverly Anne Bullen, s.b. (*Univ. of Wisconsin*) 1947, s.m. (*Wellesley Coll.*) 1950, s.m. in hyg. (*Harvard Univ.*) 1960.
Thesis: Physical Inactivity as a Factor Associated with Obesity in Adolescent Girls
Special Field: Nutrition

Benjamin Charles Duggar, s.b. (*Yale Univ.*) 1955, s.m. (*Univ. of Pittsburgh*) 1956.
Thesis: Continuous Control Performance of the Human Upper Extremity
Special Field: Environmental Health (Human Factors)

Takuya Hayashida, b.agr. (*Kyushu Univ., Japan*) 1953, m.agr. (*ibid.*), 1955.
Thesis: The Role of Essential Fatty Acids in Rat Liver Mitochondria
Special Field: Nutrition

Hsiang Ju Lin, a.b. (*Columbia Univ.*) 1953, s.m. in hyg. (*Harvard Univ.*) 1959.
Thesis: Retention of Calcium and Scandium in Cell Cultures
Special Field: Nutrition

Master of Public Health

Theodor Abelin, m.d. (*Univ. of Berne*) 1960.
Eldon Earl Bell, s.b. (*Univ. of Washington*) 1956, m.d. (*ibid.*) 1960.
Warren Lee Berggren, m.d. (*Univ. of Nebraska*) 1955.
Bernard Desmond Challenor, a.b. (*Hunter Coll.*) 1957, m.d. (*State Univ. of New York, Downstate Medical Center*) 1961.
Calvin Chandler Chapman, s.b. (*Yale Univ.*) 1948, m.d. (*Univ. of Rochester*) 1959.
Julia Jyh-Ning Chen, m.d. (*National Taiwan Univ.*) 1961.
Francois Henri Dresse, m.d. (*Liege State Univ., Belgium*) 1960.
Manning Feinleib, a.b. (*Cornell Univ.*) 1956, m.d. (*State Univ. of New York, Downstate Medical Center*) 1961.
Harold Hendrix Fry, m.d. (*Univ. of Tennessee*) 1955.
Harry Leon Gibbons, s.b. (*Utah State Univ.*) 1955, m.d. (*Univ. of Utah*) 1958.
Robert Gordon Hansen, d.d.s. (*Northwestern Univ.*) 1955.
William Henry Hark, a.b. (*West Virginia Univ.*) 1954, s.b. (*ibid.*) 1955, m.d. (*Medical Coll. of Virginia*) 1957.
Moses Alfred Haynes, s.b. (*Columbia Univ.*) 1950, m.d. (*State Univ. of New York, Downstate Medical Center*) 1954.

Earle Rodman Heine, A.B. (*Ohio Wesleyan Univ.*) 1951, M.D. (*Harvard Univ.*) 1955.

Paul Emil Hoffman, A.B. (*Heidelberg Coll.*) 1950, M.D. (*St. Louis Univ.*) 1954.

Ralph Allen Kilby, A.B. (*Williams Coll.*) 1944, M.D. (*Univ. of Buffalo*) 1948, S.M. (*Univ. of Minnesota*) 1956.

Mahmood-ul-Hassan Kuraishy, M.B.,B.S. (*Univ. of the Punjab*) 1953.

Edwin James Lieberman, A.B. (*Univ. of California*) 1955, M.D. (*ibid.*) 1958.

Delvin Edmar Littell, A.B. (*Southern Missionary Coll.*) 1955, M.D. (*Loma Linda Univ.*) 1959.

Ramiro Martinez-Silva, M.D. (*Univ. of Santiago, Spain*) 1955, M.D. (*Univ. of Hamburg*) 1957.

James Ostermann Mason, A.B., M.D. (*Univ. of Utah*) 1955, M.D. (*ibid.*) 1958.

Steven Lavelle Moore, S.B. (*Millsaps Coll.*) 1953, M.D. (*Univ. of Mississippi*) 1957.

Muhammad Kamel Muzayyin, M.D. (*American Univ. of Beirut*) 1946.

Deirdre Mary O'Connor, L.R.C.P.&S.I. (*Royal Coll. of Physicians and Surgeons, Ireland*) 1956.

Johannes Maria Vianney Oomen, M.D. (*State Univ., Utrecht, Holland*) 1961.

Presentacion Corpus Peralta, M.D. (*Univ. of the Philippines*) 1946, M.P.H. (*ibid.*) 1958.

Francis Xavier Pi-Sunyer, A.B. (*Oberlin Coll.*) 1955, M.D. (*Columbia Univ.*) 1959.

Donald Joseph Rosato, M.D. (*Temple Univ.*) 1959.

Saleh Sagheb, M.D. (*Univ. of Tehran*) 1951.

Arthur John Salisbury, S.B. (*Yale Univ.*) 1948, M.D. (*Harvard Univ.*) 1952.

Margarethe Sanne, M.D. (*Acad. of Medicine, Dusseldorf*) 1954, M.P.H. (*Univ. of Hamburg*) 1958.

John Theodore Schwartz, A.B. (*Dartmouth Coll.*) 1947, S.M. (*Univ. of Notre Dame*) 1950, M.D. (*Jefferson Medical Coll.*) 1955.

Kazem Shayan, M.D. (*Univ. of Tehran*) 1956, D.P.H. (*American Univ. of Beirut*) 1960.

Nicolaas Martinus van der Hoff, LIC. (*State Univ., Utrecht, Holland*) 1949, M.D. (*State Univ., Leiden, Holland*) 1956.

Master of Industrial Health

Grover Cleveland Harrison, M.D. (*Univ. of Oklahoma*) 1960.

Master of Science in Hygiene

(in the field of Biostatistics)

David Morris Nitzberg, A.B. (*Columbia Univ.*) 1956, S.M. (*Ohio State Univ.*) 1957.

(*in the fields of Biostatistics and of Demography and Human Ecology*)

Mohammad Afzal, B.SC. (*Univ. of the Punjab*) 1957, M.A. (*ibid.*) 1959.
Md. Aminur Rohman Khan, B.SC. (*Univ. of Dacca*) 1957, M.SC. (*ibid.*) 1959.

(*in the field of Demography and Human Ecology*)

Rabindra Nath Basu, M.B.,B.S. (*Univ. of Calcutta*) 1952, D.P.H. (*ibid.*) 1954.

(*in the field of Epidemiology*)

Kamal Tawfik Abou Daoud, M.D. (*American Univ. of Beirut*) 1937, D.T.M.&H. (*London School of Hygiene and Tropical Medicine*) 1962.
Milan Fiala, M.D. (*Univ. of Geneva*) 1959.
David Schottenfeld, A.B. (*Hamilton Coll.*) 1952, M.D. (*Cornell Univ.*) 1956.
Paul Maurice Guilford St-Aubin, M.D. (*Univ. of Toronto*) 1946.

(*in the field of Public Health Practice*)

Samuel Levey, A.B. (*Bowdoin Coll.*) 1955, A.M. (*Columbia Univ.*) 1956, A.M. (*State Univ. of Iowa*) 1959, PH.D. (*ibid.*) 1961.

(*in the field of Public Health Practice, Community Mental Health*)

Lanford Harold DeGeneres, S.B. (*Centenary Coll.*) 1942, M.D. (*Tulane Univ.*) 1945.
Ferdinand Rudolph Hassler, S.B. (*Oklahoma State Univ.*) 1952, M.D. (*Univ. of Oklahoma*) 1955.
Robert Stanton Nichols, A.B. (*Lehigh Univ.*) 1950, PH.D. (*Univ. of Rochester*) 1956.
Herbert Charles Schulberg, A.B. (*Yeshiva Univ.*) 1955, A.M. (*Columbia Univ.*) 1956, PH.D. (*ibid.*) 1960.
Alan Peter Sheldon, B.A. (*Univ. of Cambridge*) 1954, M.B.,B.CHIR. (*ibid.*) 1957, M.A. (*ibid.*) 1958.

(*in the fields of Public Health Practice and of Demography and Human Ecology*)

Harwant Singh Dhillon, B.SC. (*Government Coll., Punjab, India*) 1949, M.SC. (*Univ. of Delhi*) 1952.
Prabha Malhotra, M.B.,B.S. (*Univ. of Calcutta*) 1946.
Lilabati Pattanaik, M.B.,B.S. (*Urkal Univ., India*) 1953.
Kameshwar Sahay Sinha, B.A. (*Bihar Univ., India*) 1954, M.A. (*Univ. of Patna, India*) 1956, PH.D. (*Univ. of Delhi*) 1961.

(*in the field of Radiological Health*)

Harry George Barrett, S.B. (*City Coll. of New York*) 1956.
Joseph David Brain, A.B. (*Taylor Univ.*) 1961, S.M. (*Harvard Univ.*) 1962.
Parker Cramer Reist, S.B. (*Pennsylvania State Univ.*) 1955, S.M. (*Massachusetts Institute of Technology*) 1957.

Bernard Shleien, PHARM.D. (*Univ. of Southern California*) 1957.

On March 2, 1964, the following degree was conferred:

DOCTOR OF SCIENCE IN HYGIENE

Irwin Schultz, A.B. (*New York Univ.*) 1949, M.D. (*ibid.*) 1954, S.M. IN HYG. (*Harvard Univ.*) 1960.

Thesis: Viruria After Intravenous Injection of Mice and Rats with Bacteriophage, Poliovirus, and Herpes Simplex Virus

Special Field: Tropical Public Health

FALL TERM — FIRST PERIOD (September 28 to November 21, 1964)

		Credit Units	
Interdepartmental Course			
1a	The Human Community **	2.5	
2a,b,c,d	Biostatistics and Epidemiology ***	1.75	(7) †
Environmental Health			
2a,b	Radiological Hygiene	2	(4)
3a,b	Occupational Medical Clinics	.5	(1)
5a,b	Aviation Health and Safety	1	(2)
Biostatistics			
1a,b	Principles of Biostatistics *	1.75	(3.5)
15a,b	Departmental Seminar	1	(2)
Demography and Human Ecology			
40a,b	Introduction to Ecology and Demography	1	(2)
Epidemology			
1a,b	Principles of Epidemiology *	1.5	(2.5)
15a,b	Departmental Seminar	1	(2)
Industrial Hygiene			
2a,b	Industrial Air Analysis	2	(4)
Maternal and Child Health			
15a,b	Departmental Seminar	1	(2)
Microbiology		Credit Units	
1a,b,c	Ecology and Epidemiology of Infectious Diseases **	2	(6)
15a,b	Seminar in Microbiology	1	(2)
Nutrition			
1a,b	Public Health Nutrition **	1.5	(2.5)
Physiology			
1a,b	Human Physiology	1.5	(3)
Public Health Practice			
1a,b	Organization & Admin. of Health Services I *	1	(3)
3a,b	Economics and Administration of Medical Care	1	(2)
15a,b	Departmental Seminar	1	(2)
Tropical Public Health			
1a,b,c	Ecology and Epidemiology of Infectious Diseases ** (see listing under Microbiology)		
2a,b	Ecology and Prevention of Tropical Diseases	1	(2)

Unscheduled courses: Interdept. Course 42a,b; Industrial Hygiene 6a,b; and all 17 courses. (See Department for description)

* Required of M.P.H. candidates ** Semi-elective courses for M.P.H. candidates *** Required of S.M. in Hyg. candidates

† Figures in parentheses are units for entire course, if this runs longer than one period.

FALL TERM — FIRST PERIOD

September 28, 1964 to November 21, 1964

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:30						
9:30	INTERDEPARTMENTAL 1a**	BIOSTAT. 1a,b*	INTERDEPARTMENTAL 1a**	BIOSTAT. 1a,b*	INTERDEPARTMENTAL 1a**	
10:30		EPID. 1a,b* / PHYS. 1a,b	MICRO.-T.P.H. 1a,b,c **	EPID. 1a,b* / PHYS. 1a,b		INTER-DEPT. 2a,b,c,d *** / ENV. HEALTH 3a,b
11:30	P.H. PRACTICE 1a,b*	INTER-DEPT. 2a,b,c,d *** / MICRO.-T.P.H. 1a,b,c**	NUTRITION 1a,b**	INTER-DEPT. 2a,b,c,d *** / MICRO.-T.P.H. 1a,b,c**	P.H. PRACTICE 1a,b* / NUTRITION 1a,b**	
12:30						
1:30						
2:30	BIOSTAT. 1a,b* LAB.	IND. HYG. 2a,b LAB. / P.H. PRACTICE 3a,b	ENV. HEALTH 5a,b BIOSTAT. 15a,b EPID. 15a,b M.C.H. 15a,b MICRO. 15a,b P.H.P. 15a,b T.P.H. 2a,b	IND. HYG. 2a,b LAB. / MICRO.-T.P.H. 1a,b,c** LAB.	ENV. HEALTH 2a,b LECT. & LAB. / DEMOG. & H. E. 40a,b	
3:30						
4:30			ENV. HEALTH 2a,b			
5:30						

* REQUIRED OF M.P.H. CANDIDATES

** SEMI-ELECTIVE COURSES FOR M.P.H. CANDIDATES

*** REQUIRED OF S.M. HYG. CANDIDATES

		Credit Units	
Interdepartmental Course			
2a,b,c,d	Biostatistics and Epidemiology ***	1.75	(7) †
3b	History and Philosophy of Public Health	1	
Environmental Health			
1b	Man's Responses to the Physical Environment**	2.5	
2a,b	Radiological Hygiene	2	(4)
3a,b	Occupational Medical Clinics	.5	(1)
5a,b	Aviation Health and Safety	1	(2)
Biostatistics			
1a,b	Principles of Biostatistics *	1.75	(3.5)
15a,b	Departmental Seminar	1	(2)
Demography and Human Ecology			
40a,b	Introduction to Ecology and Demography	1	(2)
42b	Demographic Techniques	1.5	
Epidemology			
1a,b	Principles of Epidemiology *	1	(2.5)
3b	Clinical Problems in Infectious Disease	1	
15a,b	Departmental Seminar	1	(2)
Industrial Hygiene			
2a,b	Industrial Air Analysis	2	(4)
Maternal and Child Health			
15a,b	Departmental Seminar	1	(2)
Microbiology			
1a,b,c	Ecology and Epidemiology of Infectious Diseases **	2	(6)
15a,b	Seminar in Microbiology	1	(2)
Nutrition			
1a,b	Public Health Nutrition **	1	(2.5)
Physiology			
1a,b	Human Physiology	1.5	(3)
2b	Environmental Physiology	1	
Public Health Practice			
1a,b	Organization & Admin. of Health Services I *	2	(3)
3a,b	Economics and Administration of Medical Care	1	(2)
7b	Development of Personality	1	
15a,b	Departmental Seminar	1	(2)
Tropical Public Health			
1a,b,c	Ecology and Epidemiology of Infectious Diseases ** (see listing under Microbiology)		
2a,b	Ecology and Prevention of Tropical Diseases	1	(2)
44b	Clinical and Pathologic Features of Tropical Diseases	1	

Unscheduled courses: Interdept. Course 42a,b; Industrial Hygiene 6a,b; and all 17 courses. (See Department for description)

* Required of M.P.H. candidates ** Semi-elective courses for M.P.H. candidates *** Required of S.M. in Hyg. candidates

† Figures in parentheses are units for entire course, if this runs longer than one period.

FALL TERM — SECOND PERIOD

November 23, 1964 to January 30, 1965

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:30						
9:30	ENVIRONMENTAL HEALTH 1b**	BIOSTAT. 1a,b*	ENV. HEALTH 1b**	BIOSTAT. 1a,b*	ENVIRONMENTAL HEALTH 1b**	ENV. HEALTH 1b**
10:30		EPID. 1a,b*	MICRO.-T.P.H. 1a,b,c,**	EPID. 1a,b*		INTER-DEPT. 2a,b,c,d ***
11:30	P.H. PRACTICE 1a,b*	INTER-DEPT. 2a,b,c,d ***	NUTRITION 1a,b**	INTER-DEPT. 2a,b,c,d ***	P.H. PRACTICE 1a,b*	ENV. HEALTH 3a,b
12:30		PHYS. 1a,b		PHYS. 1a,b		
1:30		MICRO.-T.P.H. 1a,b,c,**		PHYS. 2b		
2:30	BIOSTAT. 1a,b* LAB.	IND. HYG. 2a,b LAB.	ENV. HEALTH 5a,b BIOSTAT. 15a,b EPID. 15a,b M.C.H. 15a,b MICRO. 15a,b P.H.P. 15a,b T.P.H. 2a,b	IND. HYG. 2a,b LAB.	ENV. HEALTH 2a,b LECT. & LAB.	
3:30		P. H. P. 3a,b	ENV. HEALTH 2a,b	MICRO.-T.P.H. 1a,b,c** LAB.	DEMOG. & H.E. 40a,b	
4:30		T. P. H. 44b	INTER-DEPT. 3b		DEMOG. & H.E. 42b LAB.	
5:30		PHYS. 2b			P. H. P. 7b	
		EPID. 3b LECT. & CLINIC				
		DEMOG. & H.E. 42b				

* REQUIRED OF M.P.H. CANDIDATES

** SEMI-ELECTIVE COURSES FOR M.P.H. CANDIDATES

*** REQUIRED OF S.M. HYG. CANDIDATES

		Credit	Units
INTERDEPARTMENTAL COURSE			
2a,b,c,d	Biostatistics and Epidem.***	1.75	(7)†
4c,d	Research Methods in Community Health	2	(4)
ENVIRONMENTAL HEALTH			
2c,d	Radiation Dosimetry	1.5	(3)
4c,d	Occupational Medical Clinics	.5	(1)
5c,d	Aviation Health and Safety	1	(2)
6c,6d	Human Factors in Occupational Performance and Safety	1	
BIOSTATISTICS			
2c,d	Statistical Methods	2	(4)
15c,d	Departmental Seminar	1	(2)
EPIDEMIOLOGY			
2c,d	Epidemiology of Non-Infectious Disease **	1	(3)
4c,d	Human Heredity	1	(2)
15c,d	Departmental Seminar	1	(2)
INDUSTRIAL HYGIENE			
1c,d	Basic Problems in Occupational Health	3.5	(7)
MATERNAL AND CHILD HEALTH			
1c	Principles of Maternal and Child Health **	2	
2c,d	Problems and Programs in Maternal and Child Health	2	(4)
MICROBIOLOGY			
1a,b,c	Ecology and Epidemiology of Infectious Diseases **	2	(6)
11c	Public Health Lab. Proc.	2	
15c,d	Seminar in Microbiology	1	(2)
NUTRITION			
2c,d	Advanced Topics	1	(3)
3c,d	Laboratory Technics	1	(2)
40c,d	Nutritional Aspects of Human Disease	1	(2)
PHYSIOLOGY			
3c,d	Principles of Toxicology	1.25	(2.5)
5c,d	Radiation Biology	1.5	(3)
PUBLIC HEALTH PRACTICE			
2c,d	Organization & Admin. of Health Services II	2	(4)
4c,d	Case Study Analysis of Economic and Administrative Problems in Medical Care	1	(2)
5c,d	Health Education	1	(2)
8c,d	Health and Illness in Cross-Cultural Perspective	1	(2)
15c,d	Departmental Seminar	1	(2)
TROPICAL PUBLIC HEALTH			
1a,b,c	Ecology and Epidemiology of Infectious Diseases ** (see listing under Microbiology)		
7c	Laboratory Technics	2	

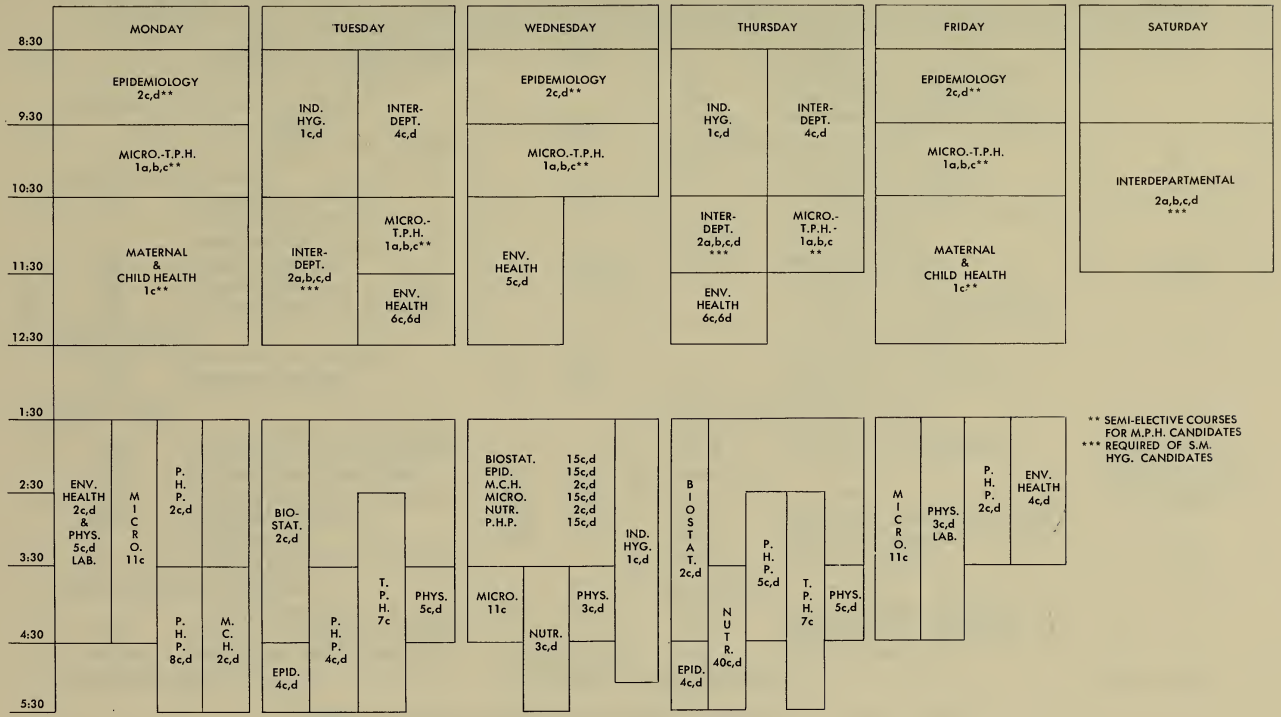
Unscheduled courses: Interdept. Course 42c,d; Demog. & H.E. 41c,d; Env. Health 2c,d (Lectures), 3c,d, 8c,d, 40c,d; Ind. Hyg. 7c,d, 8c,d; Microb. 12c; T.P.H. 5c,d; and all 17 courses. (See Department for description)

** Semi-elective courses for M.P.H. candidates *** Required of S.M. in Hyg. candidates

† Figures in parentheses are units for entire course, if this runs longer than one period.

SPRING TERM — THIRD PERIOD

February 8, 1965 to April 3, 1965



** SEMI-ELECTIVE COURSES FOR M.P.H. CANDIDATES

*** REQUIRED OF S.M. HYG. CANDIDATES

		Credit	Units
INTERDEPARTMENTAL COURSE			
2a,b,c,d	Biostatistics and Epidem.***	1.75	(7)†
4c,d	Research Methods in Community Health	2	(4)
ENVIRONMENTAL HEALTH			
1d	Principles of Water and Food Sanitation *	2.5	
2c,d	Radiation Dosimetry	1.5	(3)
4c,d	Occupational Medical Clinics	.5	(1)
5c,d	Aviation Health and Safety	1	(2)
6c,6d	Human Factors in Occupational Performance and Safety	1	
BIOSTATISTICS			
2c,d	Statistical Methods	2	(4)
15c,d	Departmental Seminar	1	(2)
EPIDEMIOLOGY			
2c,d	Epidemiology of Non-Infectious Disease **	2	(3)
4c,d	Human Heredity	1	(2)
5d	Epidemiologic Problems in Infectious Disease	2	
15c,d	Departmental Seminar	1	(2)
INDUSTRIAL HYGIENE			
1c,d	Basic Problems in Occupational Health	3.5	(7)
MATERNAL AND CHILD HEALTH			
2c,d	Problems and Programs in Maternal and Child Health	2	(4)
MICROBIOLOGY			
2d	Current Research	1	
13d	Rickettsial and Viral Diseases	3	
15c,d	Seminar in Microbiology	1	(2)
NUTRITION			
2c,d	Advanced Topics	2	(3)
3c,d	Laboratory Technics	1	(2)
40c,d	Nutritional Aspects of Human Disease	1	(2)
PHYSIOLOGY			
3c,d	Principles of Toxicology	1.25	(2.5)
5c,d	Radiation Biology	1.5	(3)
PUBLIC HEALTH PRACTICE			
2c,d	Organization & Admin. of Health Services II	2	(4)
4c,d	Case Study Analysis of Economic and Administrative Problems in Medical Care	1	(2)
5c,d	Health Education	1	(2)
6d	Legal Problems	1	
8c,d	Health and Illness in Cross-Cultural Perspective	1	(2)
15c,d	Departmental Seminar	1	(2)
TROPICAL PUBLIC HEALTH			
3d	Problems in Tropical Health	1	
8d	Introduction to Molluscs	1	
9d	Introduction to Medical Entomology	1	

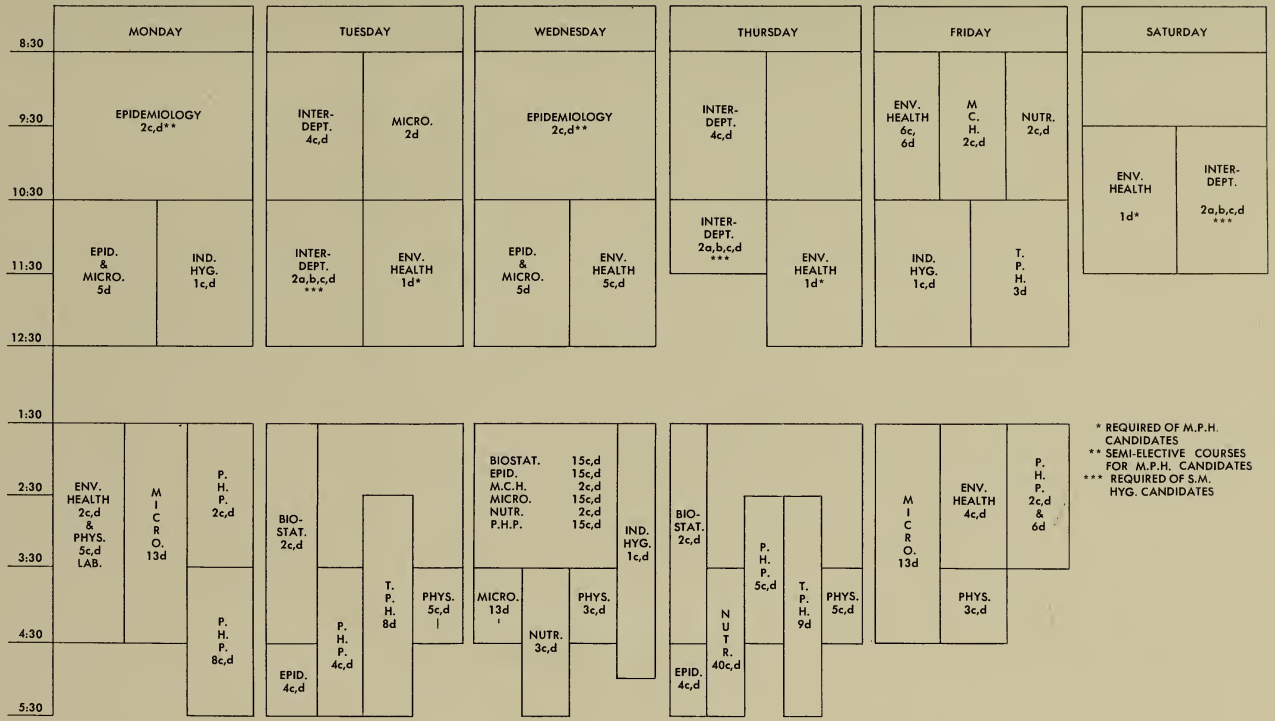
Unscheduled courses: Interdept. Course 42c,d; Demog. & H.E. 41c,d; Env. Health 2c,d (Lectures), 3c,d, 7d, 8c,d, 40c,d; Ind. Hyg. 7c,d, 8c,d; Mat. and Child Health 3d; Nutrition 5d; Physiology 4d; T.P.H. 5c,d; and all 17 courses. (See Department for description)

* Required of M.P.H. candidates ** Semi-elective courses for M.P.H. candidates *** Required of S.M. in Hyg. candidates

† Figures in parentheses are units for entire course, if this runs longer than one period.

SPRING TERM — FOURTH PERIOD

April 12, 1965 to June 5, 1965



* REQUIRED OF M.P.H. CANDIDATES

** SEMI-ELECTIVE COURSES FOR M.P.H. CANDIDATES

*** REQUIRED OF S.M. HYG. CANDIDATES

CALENDAR FOR THE ACADEMIC YEAR 1964–65

September 19, Monday to September 23, Friday	Orientation Program for Foreign Students
September 21, Monday to September 23, Friday	Registration of Students

FALL TERM, SEPTEMBER 28, 1964 TO FEBRUARY 6, 1965

September 28, Monday	First Period begins
October 12, Monday	Columbus Day: a holiday
October 16, Friday	Last day for changes in "a" and "a.h" courses of study
November 11, Wednesday	Veterans' Day: a holiday
November 21, Saturday	First Period ends
November 23, Monday	Second Period begins
November 26, Thursday	Thanksgiving Day: a holiday
December 11, Friday	Last day for changes in "b" courses of study

RECESS FROM SATURDAY, DECEMBER 20, 1964 TO SUNDAY, JANUARY 3, 1965

January 30, Saturday	Second Period closes end
February 1, Monday to February 6, Saturday	Directed reading period, supervised special studies or field observations

SPRING TERM, FEBRUARY 8, 1965 TO JUNE 17, 1965

February 8, Monday	Third Period begins
February 22, Monday	Washington's Birthday: a holiday
February 26, Friday	Last day for changes in "c" and "c.d" courses of study
April 3, Saturday	Third Period ends

RECESS FROM SUNDAY, APRIL 4, 1965 TO SUNDAY, APRIL 11, 1965

April 12, Monday	Fourth Period begins
April 30, Friday	Last day for changes in "d" courses of study
May 31, Monday	Memorial Day: a holiday
June 5, Saturday	Fourth Period ends
June 17, Thursday	Commencement

Research Laboratories
584 Huntington Avenue